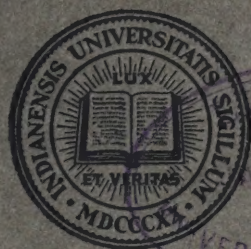


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**Fourth
Conference on Educational
Measurements**

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FOURTH ANNUAL CONFERENCE
ON
EDUCATIONAL MEASUREMENTS



Held at Indiana University, Bloomington, Ind.,
Friday and Saturday, April 20 and 21, 1917

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"Any business man who is managing a business in which he expects to make profits will have standards from which he will work. He will have measuring sticks to test the efficiency of his output; he will have units of accomplishment; he will have cost accounting systems; and he will have standards of many kinds. He will also have a continual system of testing and working over what he is doing, to find out whether what he is doing is the best that can be done with the money he has at hand, and whether the output is as large as he could well produce with the work and money he has to invest in it.

"In the business world the business man is continually facing the question of justifying his work to his stockholders. The stockholders demand profits; they want to know whether the business is being efficiently managed; and if the work is not being efficiently managed, as determined by the percentage of profit on the common stock, they demand that there shall be some reasons given to them why it is not paying, or else that there shall be a change in the management of the enterprise. . . .

"In our school work very often we have nothing of that kind. Our specifications are not always dictated by the needs of the future; too often they are framed by those who are thinking in terms of the past. We have no unit-cost accounting systems; we do not continually measure the output. An age and grade distribution sheet for almost any school system would show a very large amount of waste in the process of manufacture."—ELLWOOD P. CUBBERLEY, in *Proceedings of Indiana University Conference on Educational Measurements*, 1916.

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Foreword

THE fourth annual conference on educational measurements has still continued in part the lines of discussion inaugurated in the three previous conferences relative to the measurement of achievement in certain school subjects. This is particularly true in arithmetic and reading.

The two studies on the measurement of arithmetical abilities in Indiana published in 1915 and 1916 by Dr. Melvin E. Haggerty have stimulated a third survey in arithmetic in which twenty-seven towns and cities participated, the complete results of which will soon go to press. A brief report of the study by Dean H. L. Smith given at the conference has been incorporated in this bulletin.

A further study on the measurement of oral and silent reading by the use of the Gray Oral and Silent Tests was begun under the direction of the Bureau of Coöperative Research at the first of the year 1916-17. Miss Cecile White gave a brief summary of the results at the fourth conference. Professor W. S. Gray, author of the tests, was secured to write an interpretation of the data received from the schools. The complete report of the study is now in press.

Two other important reports of investigations were submitted to the conference; one by Professor W. W. Black on a study in handwriting, and another by Calvin P. Stone on educational research at the Indiana State Reformatory.

Professor W. F. Book in his address gave the conference a vision of the vast opportunities for experimental work as yet untouched in Indiana. Professor R. J. Leonard expressed the conviction in his address that standards in the new field of vocational education were essential.

Two practical demonstrations in the administration of tests formed another interesting feature of the conference. Professor C. H. Judd illustrated with the lantern the giving and scoring of reading tests, while Professor G. D. Strayer demonstrated the use of his score card for school buildings and equipment by scoring the Bloomington High School.

The following motions were seconded and carried at the Saturday afternoon session, April 21:

(a) A motion to express by a rising vote of thanks the appreciation on the part of the conference of the interest the University took in providing so well for its physical and general welfare.

(b) A motion that the conference go on record as being in favor of coöperating in every way possible with the organized forces of this state in any movement that looks toward the using of boys and girls in the great conservation movement carried on at present in the United States.

(c) A motion to adopt the resolution that the conference recommend that the State Superintendent and the President of the Indiana

State Teachers' Association appoint a committee of seven members of which the State Superintendent and the President of the Indiana State Teachers' Association will be *ex-officio* members, whose duties will be to look after the interest of education in the new constitution.

Before adjournment the conference expressed its appreciation of the service rendered by the University in promoting the conferences, and particularly of that rendered by the Bureau of Coöperative Research in fostering the spirit of coöperation in the state in the scientific measurement of educational achievement.

Introductory Address

WILLIAM LOWE BRYAN, President of Indiana University

It is not my purpose to make an address but only to extend to you the heartiest welcome to Indiana University on this occasion.

I feel, as I suppose you all do at this time, that every question has to be considered in connection with the war in which we are engaged. This war was forced upon us. In the presence of this situation, we ought to mobilize every force that there is in this country for the strongest possible conduct of the war. So far as the University is concerned, our first business is to use all of the resources that are here in support of the government. At the same time, I think it is highly important that we should not think nor act hysterically. We should act with the cool judgment that a great commander uses in the thick of the battle itself. We are in danger of doing things that are foolish and ineffective. We should consider every line of action in the light of the best experience which the world affords, and the world affords a good deal of experience with reference to the conduct of the educational interests, while the war is in progress. The belligerent countries have realized that they have made great mistakes in the neglect of their children during the war.

There was held in Albany, N.Y., about a week ago a conference of persons who are interested in vocational education. There were present representatives of seventeen states. A representative of the Canadian government emphasized the fact that Canada had made serious mistakes in neglecting the children, and in encouraging children to work more hours than they should. They said, "We are in a war for our lives and we must make every sacrifice and everybody must help. The children must work, and we must relax the law with reference to child labor." The result was that they had very gravely injured large numbers of children.

This is a very good illustration of the peril in which we stand in this matter. It was patriotic, it was noble, it was heroic, but it wasn't wise; it wasn't good fighting.

I had a communication the other day from the National Society of Child Labor, an organization which has been very effective in ameliorating the laws with reference to child labor. The officers of this society were sending out the warning to us who are members of the society that we should not make the mistake of sacrificing the children unduly in the emergency that is before us.

This is not to say that we should not organize better than ever before the children of proper age for work. I believe that we should do so, I believe that we must do so. Our Mr. Kendall has organized an industrial army in New Jersey. Boys of certain ages are organized

and are given badges or uniforms, and are trained to work in agricultural activities or in industrial activities.

What I have meant to say is that we have no more important business at the present time than to consider with the utmost care what we are to do in our schools and with our children that will be best for the country and at the same time will not involve the sacrifice of the children. I revert to the proposition which I laid down in the outset, that the most important business of all of us is to meet this great and dreadful crisis with all our might. I think very likely it will require all our might before we get thru with it. But at the same time, at every step we should avoid hysteria; we should avoid being carried away in a panic which is not justified by the facts and by the conditions. We should try, in a word, to do what the great general does in the thick of the battle, to direct all the forces that we have with the utmost economy, as well as with the greatest wisdom in order to accomplish the result.

I have not discussed in any way the philosophy of this war. We are in it and we will likely be in it for a good while, and while we are gathered here together in counsel in regard to these special matters of such very great importance, our thought should turn constantly to the great crisis that confronts our nation and the world.

The Scoring of School Buildings

G. D. STRAYER, Professor of School Administration, Teachers College,
Columbia University

WE have been spending millions and hundreds of millions of dollars in the United States for school buildings. We will continue to spend other hundreds of millions of dollars for school accommodations. We have allowed persons who call themselves architects, and sometimes school architects, to put up for us the sort of a building that they thought would stand as a monument to their memory. Sometimes they build us an Italian palace, at other times it is a Greek temple, and occasionally a medieval castle, and more recently, and fortunately, we occasionally get a good school building.

The purpose of scoring school buildings is not simply to discover our mistakes. It is rather and most importantly to discover what sort of a plan the architect proposes, and to check against this plan what might be considered standard requirements for school buildings. The score card then is of use, and the idea of scoring school buildings is legitimate in terms of going over the plan of a school building, and asking of that plan that it meet the requirements which may be reasonably laid down.

If you will look at the heading Detailed Score Card for City School Buildings on the score card (see Appendix), you will notice that the first topics are accessibility and environment. It is even suggested that the density of population and protection from noise and dust are to be considered.

There is a very modest requirement that there be thirty square feet of playground for each child. I suppose in most of the cities in Indiana you have two hundred square feet of playground for each child. You ought to have that much, if you can afford it. In the larger cities we cannot afford it, and we ordinarily have less than the thirty feet suggested.

Has it ever occurred to you that if someone were to consider carefully the problem of a site before the building is located; if someone were to study carefully the question of trend of population so that he could estimate not simply the present density of population, but the expectancy with regard to population; if one could figure as the telephone company figures where it is going to need more lines fifteen years from now; if one could determine, as the building contractor or the promoter does, where population may reasonably be expected to go, a building program could be made which would, when completed, furnish accommodations for the children? That is what is suggested in the first section of the score card. It does not pay simply to say, "Here is a piece of land that someone wants to sell: we are going to put up a building;

we can fill it if we locate it here." We need to inquire carefully with respect to the location.

In this discussion I want to tell you of two situations in which I have recently worked. One was a small New England city in which the citizens had the problem of putting up one or two new school buildings. The town was quite naturally divided as to the proper location of those buildings. The one side of the town, they called it the South Side, wanted the building, and the North Side naturally enough wanted it, too. They were going to determine by vote where to locate the building.

It was a perfectly simple thing in such a situation to make a study of the density of population and to discover that there was only one place in that city, a small city, where a building might reasonably be placed, taking into consideration lines of transportation, where the people were, where the developments were coming. If you wanted a building that was going to last for fifteen or twenty years, you had to put it there, and you could not listen to the kind of discussion which was to be found on the street with respect to the desirability of giving to one section which has not had all that it wants, this new building.

The location of a school building is an important factor to be determined by the facts that are pertinent to the location of that building. When a survey is made the result may be expected to be as in that New England town—in a unanimous vote in the town meeting for the location of the building where it belonged. But I cannot dwell upon any feature of the score card at this stage of our discussion. Suppose we go on to the question of building, meaning in this case the gross structure.

I have been fortunate enough, or unfortunate enough, to discover that school buildings are quite commonly placed on sites which are provided for them, with little or no reference to the use to which the building is to be put. It is not uncommon, when the streets of a Middle Western city run north and south, and east and west, to have the building located that way, so that half of the rooms facing the south are overwhelmed with light, so that there is always the difficulty of shutting out light and of raising and lowering the shades, usually not properly raised or lowered, so as to give the shadows in one part of the room and the excess of light in another part. Where the site is as large as it ought to be there is no excuse for locating the building in that way.

It ought to be located so that all of the rooms would have some sunshine; it ought to be built across rather than with the points of the compass. The score card suggests it; it appears reasonable to one who stops to think about it. One might expect that the architect would accommodate himself to the idea that it is important to locate his building with respect to all of the rooms, and with respect to the fact that children are to be found in all of them, at work, all of the days of the year. It is even suggested here that there is a rule or that there are conditions to be fulfilled with respect to entrances, corridors, stairways, and the rest.

Do you know that there are buildings being constructed at this time that are costing \$10,000 a room, in which the very simple expedient of

making the building safe for children is forgotten? That is, the builders make them, as they call them, fireproof, and the buildings are not fireproof because they will burn up if they get a chance, while if a fireproof stair well had been built, which is the standard of construction for a building in which a large number of persons, especially a large number of children, are to be housed, practically perfect protection would have been obtained.

During the month of February I went into a building in a large Middle Western city where I discovered an expensive building which had wonderfully beautiful fire escapes on the outside, and I said to the principal, "You use these fire escapes once a week for dismissal?" He said, "No, we could not possibly; there isn't a child in this school who would dare to go down those fire escapes." I went out on the fire escape to discover how it was constructed and found there a very unique arrangement of a bar so that you could not possibly tramp on it without being tripped. It was a rectangular piece of iron, and the sharp edge, the corner, was stuck up! That was the surface you walked on, so that your heel would catch, or your toe would trip. You could not go down that fire escape with any suggestion of safety. So simple a detail as that the architect or the man who wants to sell a fire escape of a particular brand forgets. Have you ever forgotten anything like that in the construction of a building? The difficulty is that when the plans come, and when the detail is presented for your consideration, you look for all of the things that you remember, and there are many details that you do not remember.

There are many details that go or ought to go to make up a good building, which at the time that the plans are presented for your consideration—at the time that you give your O.K. to the school board—you should have in mind.

I need not go on with the score card, then, in order to suggest that its primary purpose is to call attention to all of the details which go to make up the satisfactory building so that anyone who is charged with any degree of responsibility for the construction of the building can check against each item of that building while it is still in the stage of being planned.

If one had time to run thru the score card, as it appears here (see Appendix), he would find a discussion, for example, of service system, fire protection, cleaning, artificial lighting. I cannot pass artificial lighting without stopping for a minute. There are buildings in which artificial lighting is being distributed in such a way as to give twenty-five foot candles at some desks in the room on a dark day or on some nights when the building is in use, while at other desks in the same room the light is so inefficient that it is practically impossible to use that part of the equipment.

Apparently someone has figured that it would take so many candle power to illuminate a certain area; then he did not take into consideration the distribution of that candle power so as to light each desk. You say it is an obvious, simple thing. No one should neglect to place those lights, preferably three in a row, and three rows of them, and keep them to the side of the room where the desks are, if one aisle is larger than

the other, and yet half of the schoolrooms in which I have been during the past year in which artificial lighting has been provided are not so distributing the light which they provide.

If you will look in the last number of the *School Board Journal*, you will find that the architects and persons who are supplying certain kinds of equipment point with pride to the buildings recently constructed, and if you will take the trouble to look at those buildings you will discover that many of them are ugly and possibly not properly lighted by virtue of the fact that the architect thought that he had to distribute windows evenly over the entire wall surface of his building. He could not get away from the idea that if he had a room with three sides he must distribute windows over those three sides more or less regularly placed.

I went into a series of buildings built in a community that is considered very progressive, and discovered that in every building, altho there was unilateral lighting, the builders had, in every case, placed the windows on the side which carried the solid bank of windows right up into the front corner, and I discovered that every child in the room looking at that corner of the blackboard had to look right into the window that was alongside of it—and all in the name of providing adequate lighting for the children in that room!

"Why," said the man who took me around to see that building, "we have a ratio of 1 to 4," and he would have been much better off if he had a ratio of 1 to 6, as much as I am inclined to think that is not quite enough lighting in this latitude. The detail of the score card, the idea of a standard check against the program for building, a check against it in terms of location, of the sort of site to be provided, of every detail of the building to be constructed, is most important.

It seems to me to be just a sort of common sense or efficiency, or whatever else you choose to call it, that those of us who believe in efficiency in education ought to indulge in.

It is interesting with the score card in mind to find out what happens when it is used. The first question is, "How do you arrive at the value which you attach to the various elements which go to make up your complete or your total score?" The answer which is the only answer that I know how to give to the first question is this: Men who have been responsible for the organization and administration of schools, men who have been responsible for the construction of school buildings, men who have given attention to the question of what makes an efficient school building, will, if they are asked to exercise their judgment, value one element as either more or less important. So the procedure in assigning weights to the various items of the score card was to get approximately five hundred superintendents of schools, and others interested in school architecture, to weigh values, to say how many points out of the thousand they would allow to each of the several items which go to make up the total score. And then, of course, you find the variation in judgment, but the judgments center, that is, there was a central tendency. The man who is extreme in either direction is probably not so nearly right as those men who are to be found agreeing.

In other words, we took the median score and said, "That is satisfactory."

For fear someone may object to that method, I hasten to say that it makes no particular difference what weight you assign to any element, because in the scoring of your building or in the study of the problem as presented by the score card you have to isolate each item, and ask,

TABLE I
SCORES OF TWO BUILDINGS

Scorer's No.	HAWTHORNE				VAN BUREN			
	6	9	12	Median	8	9	10	Median
<i>Items I</i>	85	71	83	83	90	88	111	93
A.....	45	30	45	45	45	40	51	45
B.....	20	26	23	23	25	28	30	28
C.....	20	15	15	15	20	20	30	20
<i>Items II</i>	94	113	91	101	81	98	80	88
A.....	15	22	16	16	20	22	22	22
B.....	44	36	26	36	34	35	26	34
C.....	35	55	49	49	27	41	32	32
<i>Items III</i>	116	123	115	125	149	148	119	135
A.....	31	32	30	31	32	60	27	32
B.....	0	8	9	8	15	9	12	12
C.....	13	15	16	15	12	16	17	16
D.....	0	0	0	0	9	1	6	6
E.....	5	15	15	15	15	4	9	9
F.....	15	2	5	5	19	10	13	13
G.....	42	41	35	41	40	43	26	40
H.....	10	10	5	10	7	5	9	7
<i>Items IV</i>	174	186	187	179	171	154	178	173
A.....	35	25	25	25	20	10	15	15
B.....	49	67	60	60	46	64	57	57
C.....	47	50	56	50	60	30	53	53
D.....	20	20	16	20	10	10	15	10
E.....	23	24	30	24	35	40	38	38
<i>Items V</i>	111	78	75	85	70	80	61	80
A.....	45	28	35	35	30	27	8	27
B.....	28	13	10	13	25	19	18	19
C.....	38	37	30	37	15	34	35	34
Total	580	571	551	573	561	568	549	569

What is the situation in this school system with respect to this element in the building? What is the situation with respect to this plan as it has to do with fire protection? What is the situation in this plan as it has to do with the lighting of classrooms? and so on thru the whole list, so that if you had arbitrarily said that you would give one hundred points to each and every item on the score card, and then had said

that each particular item is up at the top, or that it falls down, you would have been just as well off as I am by saying I am going to call this a thousand points and then distribute in terms of the median score as allowed by those who know what school buildings ought to be. But it is interesting to discover whether or not men who use the score agree, because if the measurement is good, there ought to be some sort of an agreement; that is, we ought to approach each other in the values assigned to the same plan or to the same building.

In the accompanying Table I you will find two buildings, each of which was scored by three individuals without consultation, and each of whom scored the building on a different day, so there could be no collusion; they could not have gotten together and decided; they would agree or disagree.

If you care to look over it, you will discover that the remarkable thing, possibly, is the fact that they come together pretty well all the way thru and that their totals range 580, 571, 551. If you can get an instrument that will work within that degree of variability, it is about as good as any of the instruments that we use with respect to any of the school work that we are undertaking.

I think it is fairly satisfactory, and so for the second building you find the scores running 561, 568, 549, and again I think, as evidence, it shows that it is possible for people to learn. These people were not untrained; they read the bibliography at the end of the score card; they talked over the scoring of buildings; they had thought about the matter of giving weight, of subtracting from the total which might be allowed.

If you will notice Table II in which the percentage allotment is given, if you are studying the problem from the standpoint of a group of buildings already constructed, you have this issue: What is the present efficiency of the plant? More and more it seems to me in both the large and small school systems we must ask ourselves that question, Where do we stand?

With respect to the efficiency of the plant that we have in operation, I do not think I am violating confidences at all when I suggest that St. Paul from this table (II), as it appears here, is in a most deplorable state. If you will take heating and ventilating, there are three buildings that got out of the total score which might be allowed for heating and ventilating less than 26 per cent of that score. There are thirty-six buildings with less than 51 per cent out of the total score which could be allowed for that element entering into the school building. Of course, one does not depend simply upon this score. One does not make this score out of whole cloth. What did we do? We went in on a cold day and found out what the temperature was at 8:30, 9:30, and 10:30 o'clock. We discovered rooms so cold that children had to leave, and it was just normal winter temperature for St. Paul. We found rooms drier than the Sahara Desert, and I do not hesitate to say that, because there are records to show that the Sahara Desert is not so dry as many of the schoolrooms in St. Paul.

We discovered that for fire protection there were thirty-nine build-

ings which received a score less than 36 per cent of the total number of points which could be allowed for fire protection.

We found a basement with a boiler carrying a pressure of twenty-five pounds (some of you men know what that means when you are running a low-pressure boiler at twenty-five pounds), and a wooden stairway without handrails the one exit from the basement. If that boiler ever exploded, no one would ever get out of that basement. In another school building we discovered a can of kerosene, some rags, and some trash under the only stairway that led from the second floor.

There is not in the city of St. Paul, except in, I think, four or five of their newer buildings, a fireproof furnace-room, or heating-plant room,

TABLE II

THE PERCENTILE DISTRIBUTION OF THE EFFICIENCY OF CERTAIN FEATURES
OF THE SCHOOL BUILDINGS OF ST. PAUL

(Under the percentages is given the number of buildings scoring within the range of percentage stated :)

	0 Per cent to 25 Per cent	26 Per cent to 50 Per cent	51 Per cent to 75 Per cent	76 Per cent to 100 Per cent
Heating and Ventilating System	3	33	11	3
Fire Protection System.....	29	16	4	4
Toilet System.....	1	7	29	16
Water System	24	22	4	3
Large Rooms for General Use	5	41	7	0
Cleaning System.....	0	9	29	15
Artificial Lighting System	28	16	8	1
Internal Structure.....	1	15	26	11
Gross Structure.	1	7	30	15

and yet fire insurance men tell us that 90 per cent of the fires in school-houses originate near the heating plant in the basement.

Are you at work in a school system in which the heating plant is not isolated by fireproof partitions? If you are, you are simply courting disaster, and that is what one gets when he goes into the situation and asks what is the efficiency of the present school plan.

Go on to the water system. In St. Paul there are twenty-four buildings which have less than 26 per cent of the points allowed. It is not possible for most children in the city of St. Paul to wash their hands; there is not a place to wash their hands. If they want a drink they go and stick their mouths over the faucet and get the water that way.

Now, of course, there is nothing so desperately bad as that in any of your communities. Your state law does not permit it; neither does the Minnesota law permit it. It just was. It is not what the law says. Probably if you are not very careful many of you have paid good money to install drinking fountains which are so constructed and so fed that every time a youngster wants to get a drink from that drinking fountain he puts his mouth down over the particular spot from which the water emerges and gets his drink. A school building with such arrangements

TABLE III

ST. PAUL'S ELEMENTARY SCHOOLS ARRANGED ACCORDING TO RANK

1 Lafayette	444	26 Garfield	576
2 Jefferson	458	27 Hawthorne	579
3 Monroe	464	28 Douglas	580
4 Adams	469	29 Davis	582
5 Jackson	427	30 Scheffer	582
6 Franklin	452	31 Longfellow	586
7 Webster	491	32 Washington	587
8 Rice	500	33 Harrison	607
9 Crowley	500	34 Deane	608
10 Lincoln	511	35 Smith	613
11 Hendricks	516	36 Whittier	613
12 Irving	521	37 Sheridan	615
13 Murray	524	38 Grant	617
14 Cleveland	530	39 Ramsey	627
15 Edison	531	40 Tilden	627
16 McClellan	535	41 Baker	643
17 Maxfield	538	42 Hill	661
18 Neil	538	43 Galbraith	681
19 Hancock	541	44 Phalen Park	687
20 Drew	543	45 McKinley	700
21 Sibley	549	46 Mound Park	710
22 Gorman	550	47 Gordon	712
23 Eriesson	558	48 Ames	792
24 Madison	563	49 Finch	927
25 Van Buren	569	Total	27,983
		Possible	19,000
		Percentage	57.1

for drinking is not any better than the first schoolhouse, where the good old-fashioned drinking-cup was passed around.

It is interesting to go into your plans; it has been interesting, I am sure, for some of you, to find out what you had to check against, and it ought to be interesting to some of you, it seems to me, to make the plans for reconstruction and re-equipment which are called for by these very moderate demands suggested by the score card. The total situation can be presented in a different form in Table III.

You will find an interesting analysis of the situation in St. Paul. I think copies of this table have been distributed; it begins Lafayette, Jefferson, Monroe. The names of those buildings are about the only thing in their favor out of a total of one thousand points. One may ask, it seems to me, with entire legitimacy, What is the worst building in the town? If there is more than one, that is a question of supply and new facilities.

You can carry a certain kind of conviction out of an analysis of the situation.

You may reach the conclusion, possibly, which I have reached after using the score card on some one hundred and fifty buildings—that a building which ranges above 700 points is a pretty fair sort of a place in which to conduct a school; that a building that ranges between 600 and 700 points is a kind of a building which can, with a fairly small expense, be put into the proper running condition; that a building between 500 and 600 points is a building on which you will have to spend a great deal of money if you are going to make it habitable; and that a building that scores less than 500 points is a building upon which you are going to waste money if you try to put it in the proper condition. You had better abandon it.

We have, therefore, recommended for the city of St. Paul, in the survey which was completed day before yesterday, that the first 9 buildings appearing here on this list be scrapped. The buildings are dangerous; the buildings are unsanitary; the buildings are improperly equipped; the buildings are not lighted; the buildings have nothing in them that is fit for the conduct of a school.

I cannot tell you whether we have made our case or not until the bond election in June, but I think we have presented more evidence than we could have presented if we had just gone in, taken a picture and said, "This is a very ugly building; we don't like it. It is not a fit place for children to go to school."

You carry a certain conviction, then, it seems to me, thru the presentation of your case, in detail thru the analysis of the total situation, thru the suggestion of what is standard.

Standardizing the School Plant

G. D. STRAYER

IN the scoring of school buildings or in the attempt to standardize the school plant we have discovered that it is not possible to think of school buildings as of one type. If we have to consider what is to go into the school building, we have to consider the kind of a school that is to be organized there. We must raise the question in an intermediate school, for example, of the shops that are to be placed there, of the sort of a course of study which is to be established for girls and for boys in that school.

I have become somewhat interested in the question of equipment. One might say the minimum of equipment which ought to be provided in an elementary school, because I find here too that, while all of us will agree without very much discussion that everything which I have listed on these two sheets ought to be found, and while most of you will possibly be fortunate enough to have a very great deal more than is here found, it is interesting to check with some such list, and I have just made this beginning. I would be very glad indeed if you will tell me that this listing of equipment is so inadequate that you would be entirely unwilling to accept a school building provided with the materials here found, so that I would know that they need to be greatly enlarged. You notice we list maps, globes, charts, and so on, bookcases built in, a teacher's closet, and the like.

It is strange when one goes into an elementary schoolroom and discovers that the only place where a teacher may have books which children ought to be using is the window sill, where they are in the way when the window is opened and where they are not easily available. Some day it may be suggested that it is just as important to provide a place in which a single classroom can have in succession a series of one hundred books, as it is to provide seats at which children are to work.

One of the good things about St. Paul that I have not told you about—I have told you all of the other kinds of things—is that the public library, under the same administration as the schools, is sending out constantly to every school building classroom libraries. Some of you know of the work that is done in Kansas City. I hope all of you know of the work that is done in that field at Newark, N. J. There is need not only for books but for the equipment or place in which they are to be put. A classroom often is a very barren place; there is nothing there except the blackboard and the desks. There ought to be a place in which attractive displays can be made, and that ought to be a part of every classroom equipment.

I want to call your attention, under libraries particularly, to material which is available especially for children beyond the fourth grade—government and state bulletins. If I really wanted to make an investi-

gation I should like to know in how many schools here represented this afternoon all of this material that is available is now where children can get at it and is being used: government and state bulletins, collections from the Bureau of Agriculture, Weather Bureau, Childrens' Bureau, Geological Survey, statistical abstract of the census.

I was talking to a very intelligent teacher who is very much interested in a problem which she says is the problem of her teachers' organization. She said she wanted to know why it was that school officials spent more, or less, money in her city than some place else for certain items of the budget. She said, "Where could I find anything like that?" She did not know that there was issued from the census office this fiscal statement from cities, which would have enabled her to tell just how much her city was spending and what proportion that amount was to the total city budget or school budget.

I think children ought to be interested in this sort of thing. Often the very important bulletins with respect to health, agriculture, education, and the rest, are more important than some of the statements, which are entirely untrue, found in the geography printed and edited ten years ago.

I have heard Dr. Judd say on many occasions that children in the upper grades are particularly interested in the real things that are being done in the world and not simply in literature. Here is an opportunity and this is the sort of provision which ought to be made.

Possibly you are not interested in music or pictures or industrial exhibits, but I wonder whether it would not enlighten a great many children if we took the industrial exhibit, in which there is a wealth of that material which ought to be provided, which ought to be taken care of, and which ought to be made available. Have you ever followed thru the work of the museum in St. Louis and found out how easy it is for a teacher who wants to present a particular topic in geography or history, or to offer a field in literature, to go to the museum and get from it all of the materials that are necessary to make the situation at least objective to children? They can see the objects about which she is talking; they can have some realization of what it is.

I do not know why one should separate the primary department from other departments, except that we cannot use many books there. We cannot deal so largely in abstractions. We must have more materials: the sand table, the paper, crayola, water colors, and so forth, thru the list. I do not know whether you would be satisfied with that or not, but it suggests the sort of things which ought to be provided and which ought to be considered standard equipment.

I really do want to say something about household arts and manual training. I think there has been a tendency in a great many communities to say, "We can have no work in the household arts and no work in manual training unless we can elaborately equip a shop or a place in which this work is to be done."

I am becoming convinced that in almost every school building of four rooms or more there is space now going to waste, often in the basement, sometimes in the attic, depending upon the particular year in which the building was built, in which could be installed what one

might call a general room for boys, or a general room for girls. In this room might be taught something possibly even a little more important than the kind of thing which is sometimes provided in the name of domestic science or manual training.

I know of a very new school building in which, instead of the elaborate equipment in manual training and domestic science which is ordinarily supposed to be required if you are to do anything, the authorities have equipped four rooms which are general rooms. You have suggested here something for the unfortunate building—the place where you cannot have a great manual training or cooking center—some of the things which might be put in in order to enlarge the opportunity for boys and girls, and possibly give those things which are most essential.

The stove can be an oil stove with an oven to be put on top of it. The building does not have to be piped with gas in order to begin work. A kitchen stove possibly is better than the gas stove; possibly that is the only kind of a stove any of these girls are going to use when they go home; possibly they will learn more about the thing they are going to do if you have a kitchen stove than they would if you had an elaborate gas stove.

I am not satisfied with any elementary school building that does not make some provision for lunch. Even if it be true that children never have to walk more than half a mile, there are days, there are times, when some children ought to be provided for, and it is a relatively simple thing in a very small space, and with no elaborate equipment to make some such provision.

I think I would be willing to say that most of you in your childhood, with an equipment somewhat less elaborate than that suggested here, did a kind of work which was more important than the making of models, which are sometimes to be found in the schools where the more elaborate equipment is placed. Agriculture appears at the end of the list only because there are schools in which so large a group of children are concerned with agriculture that it ought to appear quite as important as any work of the ordinary sort in cooking or manual training. It ought to be provided; it ought to be a part of the regular equipment.

I am not satisfied at all with this; it is merely a beginning; I believe we need to go into the question of the standardization of the school plant from the standpoint of everything that goes to make a satisfactory educational situation.

Now, possibly I might best spend the time that is left in telling you, or possibly letting you ask questions about, how one can best solve a local situation, and what is involved in the way of inquiring beyond the mere scoring or rating of the building.

I hold here a report which tells of the sort of data which we felt were essential in the town of Framingham, Mass. We felt first of all that it was necessary to discover what was the probable need for school accommodations in that community. I do not think that I dwelt upon that at all this morning. I believe that in every community an intelligent superintendent of schools ought to look ahead and ought not to be thinking simply of how he can take care of his present situation.

I think we have tended, in a great many cases, to bungle our building program because we had no program. We were simply trying to catch up instead of trying to plan ahead. I think the statistics of population are quite as important as the statistics which have to do with the present school attendance. Population back over a period of years should be considered so that one may at least make an estimate of what may reasonably be expected fifteen years ahead.

Officials of every business concern I have consulted with respect to the increase of population have reported that they constantly estimate for at least fifteen years. They check up against a decade the past three or four years in order to see whether the previous decade is a satisfactory index of what is happening now. I think we ought to do nothing less than that in our work in school building or construction.

One of the most interesting things that I have found is a sample distribution of employment certificates in every place in which there is a law for compulsory education. It seems to me that persons responsible for the erection of a school building ought to take account of what boys and girls do when they leave school. It seems rather an obvious sort of thing, and I know someone is going to object immediately, for the employment certificate does not tell the whole story, because the boys and girls go into an employment and then they move. But it does tell this story: it tells what is the demand in the community for employment, and even tho it be true that they move from one place to another within this whole region, it is nevertheless true that this is a measure of how much the industries are demanding; how many persons they have to have; and there is a question, then, of the relationship of the school to the preparation which is needed.

I am always interested in the fact that in a community of any considerable size one of the biggest opportunities that there is for girls is in the field of salesmanship. It is one of the fields that we have almost wholly neglected outside of Boston and two or three other centers in the United States. We try apparently to make stenographers out of everyone even tho we know that the market is particularly glutted and that there is very little opportunity in that field except for those who are exceptionally well trained.

We found it of use to raise the question, possibly one of the most interesting from my point of view that we did raise, of what the occupations of all of the adults in the community were, in so far as we could get them. You can get them sometimes, of course, in a certain sort of analysis from the census. You can get them in some communities in rather a remarkable way from a directory.

I wonder if you ever stopped to make the directory analysis or possibly, as Dean Smith did here in Bloomington at one time, a house-to-house canvass of what was going on, what people were doing, what their employments were. We found in one of our inquiries at Framingham, Mass., a person who was named as a Mayflower conserver. Now, we were very much interested in the Mayflower conserver; we thought that would fall outside of any of the occupations we had ordinarily found. On looking it up, however, we discovered that the con-

server conserved peaches and pears and other things like that, and the brand was the Mayflower!

It is interesting, if you want to see how the school, as at present organized, checks up against your employment certificates, checks up against your occupations of people in the community, to ask this question concerning student hours by subjects, How is the curriculum of the school at present organized? You will run across something as astonishing, possibly, as this: in a particular high school, English gets 1,728 student hours; history, 907; typewriting, 670. Elementary science, which is really a general science course, gets 660; German, 630; physical training, 588; Latin, 505; algebra, 387; and pretty soon you will discover, if you go down thru the list, that while most of the children leave school before the end of the second year, everything in it that has any very great weight or importance according to student hours, aside from typewriting and shorthand, leads directly to college. If you check student hours against the working papers that are issued to those same children when they leave school, you will find in a great many cases a most remarkable discrepancy between the kind of education which is being offered and the suggestion as to what people are going to do after they leave school.

I should be very glad if there are any questions; there are three minutes left for questions concerning the use of the score card, or relationship of scoring to the development of a school building plan. If not, I think I shall rest my case there.

Significance and Present Status of the Survey Movement

G. D. STRAYER

I HAD an experience recently which led me to believe that there are many people who do not understand the significance of the school survey, nor the methods which have been employed in those already conducted. I went into the office of a certain superintendent of schools where I met with him the chief officer of the board of education, and I was asked whether or not it would be possible to undertake a survey for the purpose of rating individual teachers in order that the responsibility of the local administration for the dismissal of teachers might be taken care of by the school survey.

I cite that as an example of a type of expectation with respect to the school survey, rather than as the sort of thing that might commonly be expected to result. The point I would make is that this particular administrative officer and this particular president of the board of education thought of a school survey as a means of relieving themselves of responsibility for the successful administration of their schools.

I am reminded as well that early in the development of the school survey movement it was suggested at times that school surveys were undertaken with the idea of removing someone from office. It was suggested in one of the early, and possibly one of the most important of the school surveys, by a certain man who wanted the survey brought about, that if the survey were only undertaken, it would be possible to remove from office the superintendent and that possibly even members of the board of education might see fit to resign.

That conception of a school survey seems to me to be as far from the truth with respect to the purpose and significance of the movement as it would be to suggest that a doctor be called into consultation with another doctor in order that he, the second doctor, might kill the patient, or that an engineer be called into consultation with another engineer in order that disaster might result, for I can see no possible reason for the consultation which is undertaken in the name of a school survey, except that which promises a constructive program for the development of the particular school system which is under investigation.

For that reason it seems to me that school surveys have been most successful and most significant in the program which they have proposed, rather than in the fault which they have found or the weaknesses which they have pointed out. The method of the survey to date has been largely the method of becoming acquainted with the facts, measuring somewhat more accurately than has been done hitherto by the ordinary administration in the field that we ordinarily designate as administration. For example: the school survey has sought to reveal

to those charged with administrative responsibility and to the community itself at times what is good administration.

I think, for example, of a situation in which there is a very large board of education, an unwieldy body, a group, who, in the words of one very eminent surveyor, indulge themselves in such tactics that whenever the surveyor had a friend visiting in that city and wanted to show his guest a good time he took him to a board of education meeting. The survey has been critical with respect to the administration itself, not in condemning it in its actions, but in inquiring concerning the possibility of efficiency with the type of organization at present employed.

In another community in which I have been interested, the question raised by the survey was the question of a many-headed school system. The question concerned a school system in which there were at least five separate and distinct heads. The survey sought to inquire whether or not in business enterprises, or in social enterprises in which men are engaged, it is possible or thought probable that efficiency can result from the type of organization there found. Then there has been raised constantly the problem of organization. It seems strange, when we stop to think about it, that if we go back fifteen years, no, if we go back ten years there were very few facts available in the ordinary office of the superintendent of schools or in the office of the state school system. There were very few facts upon which to base any program for the organization of a school system.

The school systems had been organized upon a theory, which originally was that if you assembled the children of a little neighborhood in a classroom and gave them a teacher you had a very good school. The reform which followed assumed that if you assembled children in the same school building and divided them up into groups you could pass them along year by year thru the school system.

Anyone who has stopped to inquire concerning the facts has met with the suggestion that possibly the first type of organization with all of its flexibility had something in it that was worth while, and that the later type of organization, which had in it all of the promise of having children exactly alike, fell short of accomplishing the result that it started out to get. For if the survey and the idea of the survey in measurement has meant anything in the field of organization, it has meant the discovery of the fact that everywhere boys and girls are being assembled in groups which are not homogeneous, but in which the children vary so tremendously in ability and in which the demand is so far beyond the possibility of accomplishment and so little compared with the possible accomplishment of others, that the system is rather awkward and needs to be reformed.

Some have been brave enough to suggest, after the measurement has been undertaken, that the reform is to consist of assembling children more frequently according to their varying capacities than we have done hitherto. It is suggested, and it seems to me wisely, that the type of experiment which has been undertaken in a few of our American cities, the experiment which suggests that at least bright children are worth taking care of, be made a common practice. It is interesting, as a result of measurement, to reach the conclusion that the most

retarded school children in the United States are the bright children. The result of every measurement that has been made in every field in which it has been undertaken establishes this fact. I say this in the light of that type of inquiry, that sort of measurement in which we attack the problem of organization.

The whole meaning, it seems to me, of the intermediate school could never have been clear had it not been for the fact that before we talked very much about surveys, Florence Kelley went into the state of Massachusetts, out into the homes of the boys and girls in that state, and said to them and to their parents, "Why did you quit going to school?" The discovery which followed was that 70 per cent of all of the parents of all of those boys and girls said, "They quit school because the school had in it nothing which was worth while for them."

The discovery by the man who made the careful investigation with respect to the continuance in high schools in New York City is significant; that discovery that a mere judgment that it was necessary to have a high school course in order to engage in the particular occupation which the boy or girl expected to enter multiplied the possibility of continuing thru the high school course. That bit of measurement suggested the possible reorganization of schools according to the variety of occupations or vocations into which boys and girls go rather than the former organization based on the prior assumption that all that was necessary was an opportunity to go to school.

But to go beyond the field of administration as such, and the field of organization, we have discovered a most interesting situation with respect to the cost of education. Again possibly you feel it is an administrative problem. It is. We had assumed apparently, in a great many communities, that all that was necessary was to build our buildings, staff them with teachers, properly heat and and ventilate them, and we have assumed that everyone was honest. I doubt whether there is any group of persons more honest than the persons who manage our schools, but we suddenly discovered, the minute we began to measure, that it cost tremendously more to educate boys and girls in one sort of a building than in another. It was discovered that in one building, a small building, it was costing \$5 more per pupil than it did in a relatively large building. It was discovered in another community that the coal necessary to heat the buildings which housed 25,000 children had been saved by installing a scheme of weighing coal in the buildings. A very prosaic sort of educational inquiry, but the kind which relieved for other uses money which had not been stolen, but which had been poorly administered.

I believe that there has been a real advance made possible for public education thru the introduction of a scheme of cost accounting, and the survey has taken it upon itself over and over again to suggest that there can be no such thing as an adequate administration of a school system any more than there can be an administration of any other enterprise without the introduction of a school of measurement, which, if you please, calls for the accounting of the money spent.

I have been interested and I have suggested from the platform today that we ought to be more intelligent with respect to the building which

we construct, and the use that we make of it. To some few of you I suggested the necessity for more careful measurement there than we had commonly indulged in. I see no reason why we should not expect that in every school building under intelligent management the psychometer, introduced to determine the degree of humidity, would be just as common as a foot-rule to determine the cubical contents of the room. I see no reason why we should not be just as certain about the amount of light furnished to every desk in the room and make our illuminometer or photometer measurements to prove our case. I see no reason why we should not do that just as we have indulged in other more common measurements.

One is astonished, when he becomes enthusiastic about the progress that has been made in the administration of public education in the United States, to discover that we have yet barely scratched the surface with respect to the enforcement of our compulsory education laws. In every city in which a careful examination of the field has been made and careful measurements have been instituted, it has been discovered that boys and girls are, some of them, amenable to the compulsory education law by virtue of the fact that at some stage or other in their careers they have been put into school and then have been followed up after that time, and that certain other boys and girls for some reason unaccountable have been left out of the school and have not been followed up.

For example, in New York City, when we instituted a permanent and continuing census, the only satisfactory basis upon which to hope to enforce compulsory education, we discovered 25,000 children who were not known to exist prior to the establishment of that rather simple educational measurement. There is only one city in the United States with which I am familiar in which there has been absolute proof that all of the children have been followed up and kept in school, and in that particular city, I hesitate to mention it here tonight, it was discovered at one stage of their type of measurement that they had 110 per cent of all of the children of the city in school! In a field so simple as that one, a field which is fundamental to the whole educational program, the survey has had to point out over and over again that only as we know where children are, only as we have a measurement which enables us to check up all of the time and tell where persons are all of the time, can we reasonably expect to get them into school.

We have also discovered that it is not enough merely to establish machinery for the purpose of keeping children in school. A measurement we instituted has discovered to us that it is possible in some cities for children to stay out of school two or three weeks before the machinery which is established gets to them and gets them back into the school. That is, we teach them to be truants, we establish the habit of truancy, because we almost give them notice that if they will just break loose we will not trouble them until they have been out two or three weeks.

We have heard much, and there is much still to be said, about the measurement of the achievements of children. It was a great step forward when we began to measure the achievements of boys and girls in such a way as to make possible the comparison among classes, among schools in the same school system, among the school systems all over

the country. It is a great contribution which is presented, when you can see on the chart, as you did this afternoon, the difference between the type of teaching of reading which gets a certain result in Cleveland and another sort of teaching of reading which gets a very different result in St. Louis.

It was necessary in the survey movement that we emphasize first of all this measurement idea, this idea of checking up, of comparing, of discovering how one situation compared with another. Out of that situation there is coming, it seems to me, and coming in considerable measure by virtue of the survey, that kind of inquiry which asks why we get this particular result, how we get a different result, and indeed in the development of tests or schemes of measurement there is coming, most certainly it seems to me, the idea of the test or measurement as a means of prognosis and not simply as a measure of something accomplished.

At the time that this conference was suggested I had hoped that some of you would become interested in certain tests in arithmetic which I hope if you have not yet tried you will some day. I refer to Dr. Woody's tests which permit of an analysis of the difficulties which children encounter in their work in the fundamental processes.

Our first measurement in arithmetic had to be a measurement of how much children could do of a particular sort of arithmetic. This second stage in the development of the tool which we use, the test which we have, is that stage in which there is prepared a measuring-stick which will enable us to tell just how far the pupil can go from an accomplishment which approaches zero to an accomplishment which approaches that limit which will prove entirely satisfactory in terms of ability to do work in the fundamental operations. I am inclined to think that in all of our work in the field of measurement we are moving rapidly in the direction of using the measuring-stick very much as the doctor uses his instruments. He takes the pulse, he gets the temperature, he finds out the rate of breathing, he makes his blood count, and then he can act intelligently in the experiment which he is to undertake, for if he is a thoroly good, well-trained physician he knows his business first and then he experiments with us. So it seems to me that in this field of education, largely as a result of the survey, we are going to measure the results that we are getting, we are going to measure in order that out of the measurements we may diagnose the case and be able to propose the experiment which will bring us results.

It is interesting that in this whole survey movement the thing that has possibly been least well done (I am not unmindful of the attempts that have been made in many of the surveys) is the discussions of the relationship of our schools to the community in terms of the curricula which we have placed in them. I think probably the reason for that lack of contribution—if it is a lack—is due to the fact that a long period of time is involved, that a most careful psychological and sociological analysis must be instituted. Then it is necessary to examine with very great care the society in which we live before proposing the curriculum which ought to prove satisfactory. Yet in this field possibly the big contributions in the field of those surveys which we have called vocational educational surveys promise much for the future of the whole system, for it is true

that in the vocational surveys we have discovered at times that the proposition made with respect to this special type of education, this highly technical sort of training, has been without any very great appreciation of the sort of skill demanded or of the time taken to learn to work in the particular vocation.

If I were then to try to summarize the situation of the survey movement in the United States and to think it over with you in terms of its significance, I would suggest first that the survey movement grew out of that movement which has spread thruout our society, that movement for efficiency which has led us to experiment in practically every field. We have tried those various systems or schemes of government, the commission or the management type. We have had the efficiency engineer going out into the business to reorganize it. We have had a tendency possibly to place too great stress upon the idea of efficiency, but out of that situation there developed first of all, if I analyze this situation correctly, the idea of investigation, the idea of determining where weaknesses were to be found, in order that the situation might be strengthened. More recently there has come a type which seems to be more worth while—the type of survey which is demanded for the presentation of a program for development.

I would like if I could to have that idea dominate all future surveys, the idea, not necessarily of pointing out the weakness in order that it might be remedied, which is simply a measure taken to relieve distress, but rather the idea of a study of the whole situation in its strength, as well as in its weakness, in order that a program for future development may be instituted.

There are, it seems to me, when one stops to consider the significance of the survey, certain very definite limitations to the application of the method which has been suggested today and applied. The survey must, by virtue of the fact that it is, as I have described it up to this moment at least, conducted by an outside agency, be limited in the possibility of following up, continuing its inquiry, checking up the value of the suggestion or recommendation which is made. It seems to me, therefore, that out of the survey movement, if it is to be most significant, there ought to be developed the idea of following the result of the survey or its recommendations on thru the next year and the period of years which is to follow in order to discover whether or not the method employed, the recommendation made, was sound, all of which seems to me in the last analysis to mean this: The survey has been instituted by virtue of the fact that we are becoming or seeking to become more scientific in the attack upon our educational problems, and that as the survey shows the way, as I think it must in many cases, so there must be following the survey work of the man, the work of the woman, who continues that problem and who follows it up over a period of years to the realization of the success which the survey promises.

I think that out of the survey movement there is to be developed the scientific attitude toward the problem of administration, and, as that develops, I believe that out of the survey movement, in so far as it is scientific, there may be expected to develop the profession of educational supervision and administration.

Practical Improvement in General School Administration, Resulting from the School Survey

G. D. STRAYER

THE topic announced is "Practical Improvement in General School Administration, Resulting from the School Survey". I think I would be willing to state that every improvement that has ever been made in school administration has grown out of a school survey, and then I would hasten to define a school survey, because everyone who is at work upon the problems of educational administration is constantly surveying his field. He is constantly inquiring concerning it, and, in proportion as he brings to the solution of his problem all of the facts that there are available, in proportion as he has surveyed the situation before he attempts to do his tasks, it seems to me you may expect improvement.

I am going to confine myself, if I may, to the actual improvements which have been made as the result of the particular type of survey which is popularly called by that name, because the survey as instituted, whether in the state or in the county or the city, is, in effect, simply an extension of the regular administrative activity. It is simply the calling in of some one to supplement the work of those regularly charged with the administration of schools, and I want to start with the state problem because I understand that you are interested in the state problem in Indiana.

What has resulted from state surveys? Not all that we can possibly hope and yet there are some things which stand out rather distinctly. For example, it has been discovered in one state survey that the most certainly political type of board that you can get is a bipartisan board of education. The minute you say that this board of education in this state is to be a board composed of seven persons, four of whom are to be Democrats and three of whom are to be Republicans, there is no one who can take a seat upon that board except a man who has stood out as a ward heeler, or a political leader in some part of his state. I say the most awful mistake that could be made in a constitutional convention would be to propose for the state of Indiana a state bipartisan board of education.

I think it has been discovered as well that on the whole it is not advantageous to place upon a state board of education men who take their place upon that board by virtue of their excellence, their learning, their skill in the field of education, and now I know that some of you will resent what I have to say. The reason is this: If the survey shows, as it has, that the only adequate type of state administration is composed on the one hand of laymen who are charged with the

responsibility of representing the public, and on the other hand of executives who are specialists in the field of education, then the distinction on the whole had better be kept. That is, the board had better be thought of as a lay board of education, a group of men who represent their state, the finest, the best men that the state has.

It may chance that an educator, a superintendent of schools, the president of a state institution may occupy a post upon that board, but to make it an *ex-officio* board, composed of persons who occupy educational posts of importance, is to suggest that the executive officers employed by that board are not of the caliber that you ought to have to administer the schools of the state.

If the survey has given us any basis upon which to plan for the future it has suggested the lay board of education. I think you might go ahead in the other way. You have been unfortunate in a sense and sometimes fortunate in the way you have administered public education. The chances I should say are in favor of the situation I have attempted very briefly to describe.

It is possible to elect a first-class man for the office of state superintendent of schools. It is not probable that over any long period of years as able men can be had for the office of state superintendent by election as can be had when the selection of a state superintendent of schools is left in the hands of a lay board with freedom to go wherever they wish to find the best people available for their executive staff. Other things have happened as a result of state surveys in the general field. There has been established, for example, as the result of one state survey, an idea of supervision which I think is essentially sound, and in another state a poor plan was recommended.

I hesitate to report upon the plan of supervision which I think is essentially unsound. I think I ought possibly to be fair and tell of both. In the case in which the state survey pointed the way to adequate supervision, it suggested that the natural unit of supervision was the county, and that is, I am sure, sound. The further suggestion was made that, in the development of this county supervision of schools, it was necessary not simply to multiply the number of supervisors charged with general supervision or responsibility, but that it was advisable to pick persons who could attack particular problems. Provision was made for those who would attack the problem of supervision for the primary school, for others who would attack the problems of supervision for the upper grades, someone who could be charged with responsibility for looking after one-room rural schools, and someone who could attack the problem of the high school organization.

The survey which made a mistake that they will not get over for years and years is the survey which suggested that the way to establish county supervision is to take your county, break it up into three and four and six units, and then put over it a supervisor who knows nothing about primary work, nothing about the upper grade work, nothing about high school work, but is just a general sort of a person who knows it all. Those two surveys stand out in my mind as distinct. The one recognizes out of all of the practice that we have had that we must specialize in supervision as we specialize in teaching. The one

survey says you cannot hope to organize adequate supervision, unless you make the unit big enough to bring into your supervisory corps persons who know particular parts of the school system so well that they can do adequate supervision in that field.

The state survey has been interested in one case at least in the establishment of an adequate scheme or plan for the collection and use of statistics. I hasten to say the *use* of statistics because all over this country today state officers of education and even sometimes local school administrative officers are engaged in collecting statistics, in order that they may fill the files in their office, but that is all that ever happens to them.

I know of one case in which over a long period of years there had been collected or kept an individual record card for every pupil who went thru the elementary school. In that particular system of schools when the cards for all of the children coming up to a certain high school were presented to the principal of the school he said, "Here, John, take them down to the furnace." That is all that ever happened to those cards; they made fuel, there was a certain amount of steam generated, I judge from the cards.

Some of the teachers in that school system would have spoken had they had a chance—of the steam that had been necessary to fill them out, but I say that there have been enlightened people who have said at least in one of the surveys, "What are these statistics for? What are we to hope to get out of them? Let us confine ourselves to those statistics which are meaningful, those which are to make a difference in the way we handle our school problem."

I know of one case, for example, in which the state department seeks thru its collection of statistics actually to keep track of what is going on in the local school systems. It actually employs intelligent persons and sends out intelligent suggestions by virtue of the work that they are doing in their statistical division. Of course, such a statistical division will probably never be organized, except under the sort of state administration which is suggested by the lay board and the professional staff chosen by virtue of their particular training. In another state in which the survey has been conducted, two thoroly capable men have been appointed for statistical work. These men have gone to work, as some of you may know, to educate the teachers of that state in the use of statistics. Recently a conference was held in which these men taught superintendents of schools, normal school teachers, and others how they might to best advantage collect statistics, make measurements, and utilize them in the actual work of administering the schools.

In another state in which a survey was undertaken there was established, as a result of the survey, the intermediate school. I don't need to discuss that here, because I am sure you are all quite as familiar with the idea as I am. But in that state boys and girls had little opportunity, except as they went to the high school out of the regularly established, absolutely uniform, eighth grade elementary school system. In that state as a result of the survey they have attacked the problem of giving a fair chance to boys and girls, even the sort who do not go on thru the traditional high school course. Plans are under way for a differentiated

course of study, and they are at the present time establishing such schools.

It has been common in the state surveys to discuss the problem of the training of teachers. Some of the recommendations it seems to me have been valuable. I am persuaded, for example, that the recommendation suggesting that we do not need and should not have a uniform training for all teachers in the first eight years of the school system is essentially sound. We ought to have rather the training for those who are to work possibly in the primary grades, the intermediate grades, the junior high school, and the other part or division of that school. I am interested as well in problems which I understand you are to attack here, the problem of the county as the unit or possible unit of supervision and administration.

There have been made some four or five county surveys which have attacked this particular problem. If it be true that the state needs to develop a strong administrative board who choose the professional staff, how much more certainly true it is that we can never hope to have a local administration until we establish the county board of education and the county superintendent and staff chosen by virtue of their fitness for the position and with relatively secure tenure by virtue of the fact that they do not have to appeal to anyone other than that small group to whom they report and who know and understand the difficulties of the work which they are undertaking.

In a recent survey, for example, it was discovered that all of the suggestions or promise of democracy with respect to the equality of opportunity which we are to provide, and the equality of burden which we are to share, disappeared when we looked into the county and asked ourselves the question, "What do people pay and what do they get?" One community was paying ten times as much in taxes on their \$100 of wealth as another community in the same county. You did not have to go out in a poor part of the state to find this condition, but right in the same county one community was paying a tax ten times greater than another, and all of the gradations between. But possibly that was not as interesting, it did not seem to me so, as this other fact, that under this system of local administration high schools and high school courses of study were extremely variable. The first inquiry that we made was, How much do teachers get? There are most excellent teachers working for \$600 a year, but the more excellent they are the less likely they are to continue to work for \$600 a year. We discovered that in the smaller high schools the teachers were at a minimum in salary. They were the kind who did not make good, they were the sort that were left over after the bigger and more important centers had taken the high school teachers that were really successful. Then we made another check. We asked what happened to one of these children when they go up against the state examination.

In New York state, as you may know, high school teachers are parties to the making up of the high school question papers. This is not an examination which is handed down from the central office, but it is made up by teachers and principals of schools from all over the state. It was discovered that there was a variation of 20 per cent in the

number or proportion of those passing those examinations between the large high schools on the one hand and the very small high schools on the other. Does that tell anything? Does that survey prove anything? It seems to me it does. It is uneconomical; costs run very high when you try to run a very small high school. Costs are reduced, teachers' salaries are increased, the quality of the instruction given is improved, as you concentrate your high school, make it larger, and give it greater variety of opportunity.

I doubt very much whether any discussion or consideration of the problems facing you in Indiana can even be thought to have attacked the problem of reforming education unless, you, every one of you, stand for the idea of the county as the unit of organization. I think we have the proof, I think that all that you need to do is to put the steam back of it to make it carry conviction all over this state. I know of the difficulties that you are going to have in this particular county of which I have been speaking; there has now been organized an association of all of the more intelligent persons of the county and they are appealing to the legislature to grant them permission to reorganize. And there are in that state, as there will be in this state, a group of the other sort, who say you are going to take our schools away from us, you are going to be undemocratic, you are not going to allow us to have as bad schools as we would like to have. I think that is about the answer.

I have been interested also in the city surveys. Altho I have touched very briefly the idea of the state survey and the idea of the county survey, I have been interested as well in the results which have come from the city survey, and there I am inclined to think possibly one of the big contributions again has been the establishment of the idea that a board of education has certain functions and that a superintendent of schools and staff have other functions.

I remember in one place in which a survey was conducted, the president of a very large branch of the American Telephone and Telegraph Company became president of the board of education. He has said, and he has represented the situation graphically, that a board of education has no more right to attempt to control education in their community thru any action which they are to take with respect to supervision, any action which they may take as to the placing of teachers, any action which they may take as to the selection of books; that they have no more right to do that than the director of a corporation would have to go into the office of the president and say, "Here, I don't like John Smith; get rid of him. This material that you are using doesn't please me, I have a friend who sells something different and I should like to have you put that into this business."

He says no man in a business enterprise ever dreams of doing anything like that. The board of directors in every business concern that I know anything about are constantly holding their executive officers for results and I am not willing to think of a superintendent of schools in any different terms than those of which I think of the man who is charged with executive responsibility elsewhere. Superintendents of schools, wherever they are, must produce results and they must give evidence of it.

I remember another superintendent of schools who had around his office charts showing the achievements of pupils. He had a board of education which in his community was called the "millionaire board of education". The members usually went to the board meeting and had the superintendent tell them what to do, did it, and went home. They usually got thru in about fifteen or twenty minutes. They got a new superintendent of schools, who began to show them what was going on in the school system. He began to show them the progress that was being made, he began to suggest the possibilities of economies. He began to suggest a program for development which would require money, which program he illustrated by graphs, and they stayed until one o'clock in the morning. He got to the point where he was using the language which they understood, and he was carrying conviction by virtue of the fact that he did not say, This is what I hope, this is what I believe, this is what I have faith in; he said, This is what I have done and this is what I hope to do by virtue of the evidence that I already have assembled here of things accomplished.

I believe that out of the survey movement, out of this insistence upon measurement, out of this attempt to find out where we are, there is developing a better sort of relationship between the board of education and the superintendent of schools, that is, the superintendent of schools who knows how to handle the professional problem—the superintendent of schools who is an expert in his field.

Do you know I hesitate to suggest it, but all of the other professional persons with whom you are acquainted are constantly being respected by virtue of the fact that they know something more than the other fellow does and that they can tell you things that you cannot possibly find out for yourself. So long as a superintendent of schools anywhere talks simply in terms of what he would like to do, what he believes in, what he hopes for, everyone else in the same community has exactly the same right and possibly may have just as good a judgment, and it is only when he becomes technical, if you please, only when he can establish his case in such a way as to make it clear, that he has available knowledge which the other fellow does not have. It is only then that he can expect to have such a relationship between himself and board that promises for the development of the school system.

I have been interested, of course, in the results which have come from the school surveys in terms of a reorganization of the system of city schools. During the past ten years every superintendent of schools worthy of the name has printed in his report an age grade table, and many of them have then gone off and forgotten it. If there is anything that ever cried to heaven for relief it is every age grade table that has ever been printed in the United States.

Don't you see there is something more than just a little bit of technique in being able to make a few statistics in order to print them in the report? The survey has suggested in every age grade table that has been printed that it is the basis upon which reorganization must take place. If you try to come back at me, and really you ought to have a chance to come back at me rather than to allow me to talk this way,

I say if you had a chance and you came back and said Yes, but my system is a small school system, I would say that that was no excuse, because there are men who have discovered that even in the small school systems it is possible at least to provide for the extreme cases, at least to provide one class, if not more than one, in which those who need special attention can be placed. Moreover, the thing that I have not been quite able to understand, is that after practically every survey that has been published has suggested the necessity for the reorganization of the last six school years, the man in the small school system has still said to me over and over again, Yes, but it doesn't apply to me. Some of you know why you are the men above all others who have something to gain by this type of reorganization. In your seventh and eighth grades you have as many teachers now as you have in your high school. Just think of the tremendous advantage you would get if you took your seventh and eighth grades, made them a part of your other organization—that is, made a six-year organization. Just think how by doubling the number of teachers that you have available for that six-year course you could differentiate your courses; how you could make provision that you now cannot make because you are running these independent organizations.

Consider this group of seventh grade teachers who are trying to cover everything and cannot possibly do it—I would not try to qualify as a seventh grade teacher. I do not see how any one can. I think he ought to have been about ten years in his preparation to be a good seventh grade teacher, but under the new type of organization, where the six-year school is established, it is possible for these teachers to specialize or for you to find the teacher who can specialize in history, geography, and so on. The thing that we never teach, or almost never teach well, can be specialized in, as the teaching of mathematics; we can specialize in the manual work or the household arts.

No, if you are in a small school system the survey points the way to a reorganization which means a much greater opportunity for the boys and girls in your community. Surveys have discovered a good many other interesting things. I am not able to talk about all of them. One of the things tho I have always been interested in is the question, How can we promote children or what kind of a marking system should we have?

The surveys have concerned themselves with those things. It has been discovered that, if you are fortunate enough in a crowded section of a particular system that I have in mind, you will pass thru that school system in a great hurry. They have to have the seats. If you live in another section of the same city (I can give it to you statistically) where the population is diminishing you go very slowly. In terms of per cent, if you happen to live near one school building, your chances are 8 to 10 of finishing the eight years of the elementary school course in less than eight years. If you live in the other community your chances are 1 to 30 of getting thru that elementary school in less than eight years and you do not have to speak a different language, wear different clothes, you do not have to be intellectual; it is just a matter of organization.

It has been discovered that if you are unfortunate enough as a high school pupil to go to school to one teacher in a German department, you have 1 chance out of 3 of being failed at the end of the first half-year that you undertake the work in German, but if you go to another you cannot fail. If a careful administrator will look into the kind of marks given by teachers he will discover variations from teachers who always pass everybody to the teachers who fail 40 per cent of their classes. If you don't believe it try it in your school and see; I am thinking particularly now of high school courses and classes.

Every one of you who is a supervisor or administrative officer ought to be a school surveyor. If you are not, you are a mighty poor sort of a school administrator or school supervisor.

Appendix

(To accompany paper of Professor G. D. Strayer)

INDIANA UNIVERSITY SCHOOL OF EDUCATION

Bureau of Coöperative Research, Bloomington, Ind.

SCORE CARD FOR SCHOOL BUILDINGS AND EQUIPMENT FOR ELEMENTARY AND HIGH SCHOOLS*

City	Building
Principal	Date
Enrollment: Boys..... Girls.....	Total
Average Daily Attendance: Boys... Girls...	Total
Number of Rooms.....	Approximate Cost....
Scorer	

INSTRUCTIONS

1. Abbreviation: S—Standard.
2. Basis for scoring—1,000 points.
3. In scoring classrooms, stairways, entrances, fire escapes, and the like, score each separately and insert the average for the final score.
4. It will be worth while to use this card in checking up blueprints of prospective buildings. To do this will require a complete set of specifications with the blueprints, also a copy of state laws and city ordinances.

SHORT FORM OF SCORE CARD

I. SITE	(125)
A. Location	(55)
1. Accessibility (25)	2. Environment (30)
B. Drainage	(30)
1. Elevation (20)	2. Nature of Soil (10)
C. Size and Form.....	(40)
II. BUILDING	(165)
A. Location	(25)
1. Orientation (15)	2. Position on Site (10)
B. External Structure	(60)
1. Type (5)	2. Material (10)
3. Height (5)	4. Roof (5)
5. Entrances (10)	6. Aesthetic Balance (10)
7. Condition (15)	
C. Internal Structure	(80)
1. Stairways (35)	2. Corridors (25)
3. Basement (15)	4. Attic (5)

* Reprinted from the *Fifteenth Year Book of the National Society for the Study of Education*, by courtesy of G. D. Strayer, Teachers' College, Columbia University.

III. SERVICE SYSTEMS	(280)
A. Heating and Ventilation System.....	(70)
1. Kind (20)	2. Installation (10)
3. Air Supply (25)	4. Distribution (15)
B. Fire Protection System.....	(65)
1. Apparatus (10)	2. Fireproofness (20)
3. Escapes (20)	4. Electric Wiring (5)
5. Fire Doors (10)	
C. Cleaning System	(20)
D. Artificial Lighting System.....	(20)
E. Electric Service Systems.....	(15)
1. Clock (5)	2. Bell (5)
3. Telephone (5)	
F. Water Supply System	(30)
G. Toilet System	(50)
1. Distribution (10)	2. Fixtures (10)
3. Adequacy (10)	4. Seclusion (5)
5. Sanitation (15)	
H. Mechanical Service Systems.....	(10)
1. Elevators (5)	2. Book-Lifts (2)
3. Waste-Chutes (3)	
IV. CLASSROOMS	(290)
A. Location and Connections.....	(35)
B. Construction and Finish.....	(90)
1. Size (25)	2. Shape (15)
3. Floors (10)	4. Walls (10)
5. Doors (5)	6. Closets (5)
7. Blackboards (10)	8. Color-Scheme (10)
C. Illumination	(85)
1. Glass Area (45)	2. Windows (30)
3. Shades (10)	
D. Cloakrooms and Wardrobes.....	(25)
E. Equipment	(55)
1. Seats and Desks (40)	2. Teacher's Desk (10)
3. Bulletin Boards (5)	
V. SPECIAL ROOMS	(140)
A. Large Rooms for General Use.....	(65)
1. Playroom (10)	2. Auditorium (15)
3. Study-Hall (5)	4. Library (10)
5. Gymnasium (15)	6. Lunchroom (10)
B. Rooms for School Officials.....	(35)
1. Offices (10)	2. Teachers' Room (10)
3. Nurses' Room (10)	4. Janitor's Room (5)
C. Other Special-Service Rooms.....	(40)
1. Laboratories (20)	2. Lecture-Rooms (10)
3. Storerooms (5)	4. Studios (5)

DETAILED SCORE CARD FOR CITY SCHOOL BUILDINGS

I. SITE

A. Location—

1. Accessibility—centrality (present and future), car lines, streets.
2. Environment—
 - (a) Physical: gardens, trees, shrubbery, buildings, hills.
(S—Skyline should not have an angle of more than 30 degrees from base of building.)
 - (b) Social: density of settlement, composition, moral influences.
 - (c) Protection: freedom from noise, dust, danger, malodors.

B. Drainage—

1. Elevation, slope. (S—Grounds should slope away from building and should not exceed 1 in. for every 3 ft.)
2. Nature of soil: residual or artificial kind, texture, aeration, hydration, surface material.

C. Size and Form—

Should be large enough and of good shape to allow for proper placing of buildings, for 30 sq. ft. of playground per child, and for school garden.

II. BUILDING

A. Location—

1. Orientation: light, exposure. (S—Southeast, east, southwest, west, and south in order.)
2. Position on site as regards appearance and economy of playgrounds.

B. External Structure—

1. Type: rectangle, square, inner court, T, H, E, U.
2. Material. (S—Brick or stone.)
3. Height: number of stories. (S—Two stories above basement.)
4. Roof: type and material. (S—Flat, waterproof, suitable for playground, proper slope for drainage.)
5. Entrances—
 - (a) Number, location, width. (S—At least two, near stair landings, 11-13 ft. wide.)
 - (b) Steps: number, protection from the elements. (S—As few as possible, unexposed.)
 - (c) Vestibules: size, lighting. (S—11-13 ft. wide, double-swing glass doors, and waterproof floors.)
 - (d) Doors: kind, opening, springs, checks, stops. (S—3½ ft. x 8 ft., opening outward with panic bolts.)
6. Aesthetic balance. (S—Simplicity and utility.)
7. Condition. (S—Should be in good repair.)

C. Internal Structure—

1. Stairways—
 - (a) Construction: kind (box, open, winding), material, tread and riser, nosing, width, landing, banister (number, kind, size, stability), soundproofness. (S—Tread, 11-13 in.; riser, 7 in.; width, 5 ft.; metal banister, 1¼ in. dia., at least two for each stairway, firmly attached.)

- (b) Number and location: proximity to exits. (S—At least two, landings near exits.)
- (c) Lighting: natural and artificial. (S—Should be well lighted.)
- (d) Sanitation: coves, corners, ledges. S—Should have sanitary coves and be free from dust-catchers.)
- 2. Corridors—
 - (a) Location.
 - (b) Construction: material, width, door arrangement, finish (chair rail, picture mold, dado). (S—Width 11-13 ft.)
 - (c) Obstructions: lockers, cases, pedestals. (S—These should not obstruct easy passage.)
- 3. Basement—
 - (a) Depth below grade, dampness, areas. (S—Depth, 3 ft.; floor and walls waterproof.)
 - (b) Boiler-room, accessibility to fuel-room, exits, ash-lifts.
 - (c) Fuel-room, size, construction, chute.
- 4. Attic, waterproof, heatproof, floor.

III. SERVICE SYSTEMS

NOTE.—Defects in any service system should be checked against the system wherever found.

A. *Heating and Ventilating System—*

- 1. Kind of system: direct, direct-indirect, gravity, plenum, plenum-exhaust.
- 2. Installation: piping, workmanship, noise, control. (S—All piping should be insulated.)
- 3. Air supply: source, amount, humidification, ducts. (S—From the top of the building—humidity 40-60 per cent; 2,000 cu. ft. per hour per pupil, should not enter with a velocity greater than 6 ft. per second.
- 4. Distribution: size, arrangement, kind of ducts, pipes, and radiators. (S—Single ducts for each room; inlets 8-9 ft. above floor, outlets near floor.)

B. *Fire Protection System—*

- 1. Apparatus: fire hose, extinguishers, water pressure, fire alarms. (S—Adequate supply on each floor; fire alarms easily accessible, automatic in boiler-room, connected with city fire department.)
- 2. Fireproofness—
 - (a) Building as a whole: rating of underwriters.
 - (b) Stairways. (S—Encased fireproof stair wells.)
 - (c) Boiler- and fuel-rooms. (S—Separate fireproof rooms.)
- 3. Fire escapes: number, location, kind, protection, number of exits. (S—In non-fireproof buildings there should be at least two fire escapes.)
- 4. Electrical work: nature and place of intake, insulation, number and kind of outlets, location of switches, meter, cut-out, cabinets. (S—Should be installed according to rules of underwriters.)
- 5. Fire doors: kind, location, operation. (S—Automatically closing.)

- C. Cleaning System*—Kind, installation, efficiency. (S—Vacuum system.)
- D. Artificial Lighting System*—Kind, amount, distribution, number, and location of switches, outlets for lanterns, etc.
- E. Electric Service Systems*—
1. Clocks.
 2. Bells and gongs.
 3. Telephones: number and location. (S—At least one on each floor.)
- F. Water Supply System*—Drinking-fountains, baths, lavatories, janitor's supply (on each floor). Installation and sanitation.
- G. Toilet System*—
1. Distribution: location, accessibility. (S—Most on first floor, others distributed.)
 2. Fixtures: seats, urinals, washbowls, sinks, towel and paper holders—size, kind, durability, and arrangement.
 3. Adequacy: number. (S—1 seat for each 15 girls, 1 seat for each 25 boys, 1 urinal stall for each 10 boys.)
 4. Seclusion: soundproofness, doors.
 5. Sanitation: finish, material, workmanship, lighting, ventilating. (S—Material—not absorbent, non-corrosive.)
- H. Mechanical Service Systems*—
1. Elevators (for buildings of more than four stories): location, fireproofness, adequacy.
 2. Book-lifts.
 3. Waste-chutes: kind, location, size. (S—Fireproof, outlets closing automatically.)

IV. CLASSROOMS

- A. Location and Connections* (to exit, drinking-fountains, toilet). Duct for base-rooms and those above fourth floor without elevators.
- B. Construction and Finish*—
1. Size. (S—Per pupil 15 sq. ft. floor space and 200 cu. ft. air space.)
 2. Shape: classroom 24x30x12 ft.
 3. Floors: material, condition (cracks, checks, splinters, loose boards, projecting ends), width of boards, soundproofness, cove, base-board, surface, finish. Stone, tile, cement and other composition floors are bad for class- or study-rooms. (S—Should be battle-ship-linoleum, or hard wood, durable, well joined, and not dust-retaining.)
 4. Walls, ceiling: plastering, finish, texture, condition, picture mold, chair rail, kind and condition of dado. (S—Hard, smooth, non-glass plaster, with cement plaster for dado, avoiding grooves and ledges.)
 5. Doors: how opened, size, kind, lock, threshold, transom, number of exits. (S—Doors without thresholds and transoms.)
 6. Closets and bookcases: location, size, convenience.
 7. Blackboards: kind, length, width, color, chalk rail, height from floor, surface, quality, condition, trim. (S—Slate, full black, on

front and side of room, 36-42 in. wide, height of chalk rail, grades I-II, 24 in.; III-IV, 26 in.; V-VI, 28 in.; VII-VIII, 30 in.; high school, 32-36 in.)

2. Color-scheme: woodwork, dado, walls, ceiling, furniture, shades, finish, fixtures. (S—Neutral color, buff or green; dado slightly darker than walls, white or cream ceiling; woodwork, furniture, and shades to harmonize in tone; dull, smooth finish.)

C. *Illumination*

1. Glass area: one-fifth to one-fourth area of floor.
2. Windows: size of mullions, nearness to ceiling, height of sill, kind of glass, distance of front window from front wall, orientation, shape. (S—From pupils' left, unilateral, grouped, symmetrical, as near ceiling as possible, $3\frac{1}{8}$ to 4 ft. from floor, plain glass, mullions not over 12 in. wide. Front windows should not come within 5 ft. of front wall; easterly exposure best; rectangular in shape.)
3. Shades: kind, material, hanging, adjustment, condition. (S—Adjustable from center.)

D. *Cloakroom, Wardrobes*—Location, size, convenience, ventilation, finish. (S—Ample ventilation and accommodation.)

E. *Equipment*

1. Seats and desks: kind, number. (S—Adjustable-movable or adjustable; not over 42 in number.)
2. Teacher's desk. (S—No platform.)
3. Bulletin boards.

V. SPECIAL ROOMS

A. *Large Room for General Use*—

1. Playroom: location, size, accessibility, adaptability, finish. (S—Per pupil 15 sq. ft. of floor space and 200 cu. ft. of air space.)
2. Auditorium—
 - (a) Location, accessibility. (S—Should be on first floor.)
 - (b) Construction: size, height, seating capacity, floor, acoustics, exits, obstructions, gallery (kind, seating capacity, location), light and nature of stage, finish, ornamentation. (S—For 80 ft. length on flat floor, stage should be 3 ft. 8 in. high; on dish floor, 3 ft.)
 - (c) Auxiliaries: dressing-rooms, curtain, setting, seats (kind, arrangement).
3. Study-hall—location, size, accessibility (especially to library), adaptability, finish.
4. Library: location, size, accessibility, form and arrangement of stacks.
 - (a) Kind, location, size, adaptability. (S—Depends on number of stacks.)
5. Gymnasium—
 - (a) Location: accessibility, segregation of sexes.
 - (b) Construction: size, floor, track, gallery, soundproofness, finish. (S—Height 22-25 ft. Length and width should relate as 3 to 2.)

(c) Auxiliaries: lockers, showers, dressing-rooms (number, kind, location, convenience, condition.)

6. Lunchroom: location, accessibility, size, adaptability, arrangement, finish, sanitation.

B. Rooms for School Officials—

1. Offices: location, size, adaptability, finish; waiting-room (ditto).

2. Teachers' room: location, size, toilet facilities, equipment, finish. (S—Equipped with chairs, couch, gas or electric plate.)

3. Nurses' room: location, size, equipment and toilet facilities (including bath), adaptability, sanitation, finish.

4. Janitor's room: location, size, convenience.

C. Other Special-Service Rooms—

1. Laboratories—

NOTE.—Include all facilities for chemistry, physics, biology, physiography, commercial work, household and industrial arts.

(a) Kind, location, size, adaptability. (S—Depends on number of pupils to be accommodated. A room 30x40 ft. will accommodate 25 pupils.)

(b) Construction: plumbing, storerooms, cabinets, finish.

2. Lecture-room: location, size, seating capacity, plumbing facilities, accessibility, fixed furniture (number, kind, arrangement).

3. Supply- and storerooms—location, size, adaptability.

4. Studios: kind, location, size, and adaptability.

NOTE.—Include drawing-, art-, and music-rooms.

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TEACHING EQUIPMENT

I. GENERAL—

- A. Maps, globes, charts, wall roller maps of world, continents, United States, state, and county since last census; 12-in. hanging globe; reading charts for system used; temporary charts, etc.
- B. Bookcases: built in or cabinet enclosed, glass doors with lock, special dictionary stand or holder.
- C. Display facilities: according to space and need, burlap surface (preferably green) yard wide, 3 feet from floor; wires above and below blackboard a good improvised scheme; glass cases or cabinets for collections.
- D. Library—
 1. Selection: should include suitable fiction, science, history, biography, and agriculture and household arts literature.
 2. Grading: children of primary, intermediate, and grammar departments well provided.
 3. Reference—
 - (a) Dictionary: unabridged, late edition, also small dictionaries properly graded, one for each two pupils above third grade.
 - (b) Reference: pupils' encyclopedia, 4 to 6 volumes.
 4. Government and state bulletins, suitable collection from U.S. Bureaus of Agriculture, Weather, Labor; Children's Bureau, Geological Surveys, Statistical Abstract of Census, State Departments of Education, Health, Agriculture, State Agricultural Colleges.
 5. At least periodicals as follows: daily paper, weekly magazine dealing with current events, farm journal, children's paper.
- E. Music—
 1. Instrument: piano, organ, or victrola.
 2. Books: good collection of standard songs with music, bound.
- F. Pictures and Decorations: few well selected and tastefully framed reprints of masterpieces, natural decorations in season, special decorations by pupils with evidence of suitable change.
- G. Industrial Exhibits: exhibits of manufactured products and processes, e.g. Baker's chocolate, Standard Oil products, Pillsbury's flour (stages of manufacture), cotton manufacture, silk manufacture, etc.
- H. Weights and Measures: liquid, dry, trip balance with English and metric weights.

II. SPECIAL DEPARTMENTS—

A. Primary—

1. Sand Table: 24 inches high, minimum area of 6 sq. ft., sand tight box with sides 4 inches high.
2. Materials: (1) papers of all kinds; (2) crayolas, water colors, brushes, etc.; (3) clay; (4) scissors; (5) rulers; (6) weaving materials; (7) word builders; (8) numbers; (9) sight cards; (10) sign printing set; (11) paste; (12) hectograph; (13) colored pegs, tooth picks, number blocks, etc.; (14) collected materials, e.g. pasteboard boxes, spools, etc.

B. Household Arts—

1. Cooking—

- (a) Stove: oil stove and oven, kitchen stove or equivalent.
- (b) Utensils: kettle, sauce and baking pans, strainer, kitchen knife, fork and spoons, measuring cup, salt and pepper shakers, frying pan, dishpan, garbage can, butcher and paring knives, potato masher, quart cup, mixing bowl, 2 plates, serving tray, tea towels, cleaning cloths, soap and scouring materials, food receptacles.

2. Warm Lunch—

- (a) Dishes: individual bowls, cups, saucers, plates, knives, forks, and spoons.
- (b) Table: suitable to be used for cooking as well, any suitable adaptation of other equipment.

3. Cupboard: dust proof, preferably glass doors, capacity for dishes, utensils, and supplies.

4. Sewing: space usable for cutting, tape measures, shears, thimbles, needles, etc., storage facilities for materials.

C. Manual Training—

1. Tools: cross cut and rip hand saws, coping saw, jack plane, hatchet, block plane, tri square, framing square, carpenter's ruler, mortise gauge, hammer, screw drivers (4 and 8 in.), chisels ($\frac{1}{4}$, $\frac{1}{2}$, and 1 in.), ratchet brace, set of auger bits ($\frac{3}{16}$ to 1 in.) drawing knife, oil and carborundum stones, oil can, files, flat and tri pliers, putty knife, anvil, 8-oz. ball hammer, 10-in. monkey wrench.

2. Bench: substantial, minimum 2 x 5, two vises (one metal, one wood faced), drawers for tools.

D. Nature Study Materials: plant presses, insect jars (poison), bottles, collections of plants, seeds, woods, flower pots, etc.: magnifying glasses (minimum 1 for each five pupils).

E. Agriculture: (1) Babcock tester with bottles, pipettes, acid, etc., unless there are a number in the homes of the community; (2) seed testers for corn and other seeds; (3) tubing, etc., for capilarity experiments; (4) litmus paper for soil tests.

Demonstration of the Gray Reading Tests

(With Use of Lantern Slides)

C. H. JUDD, Director of the School of Education, University of Chicago

I WANT to suggest to you, if I may, that I am undertaking a rather difficult task in attempting to demonstrate reading tests to an audience. As many of you know from your own contact with these tests, they are intended for individual work.

It is expected that the child will be tested by the investigator in some quiet place where the investigator can watch the child at work and can make his observations on a single individual. In order to introduce you to the spirit of those tests and in order to get the opportunity to discuss in some measure the difficulties that are encountered in the administration of the test, I am, however, going to venture a few experiments with you. I am going to ask you to turn yourselves into the subjects of this test then, and as we come on some of the results of our investigation here we shall have an opportunity to comment on the kinds of difficulties that are encountered in giving these tests to children, and we shall also have an opportunity to comment on the results that come from these tests when administered to school children.

I am going to put on the screen, first of all, a table which I borrowed from Mr. Gray's monograph ("Studies of Elementary School Reading Through Standardized Tests," p. 102, Table XXVII). May I make one general acknowledgment? Most of the material that I shall use for the afternoon discussion is borrowed from Mr. Gray, and any of you who are interested in going into details will naturally turn to his original material. I say I borrowed this table from him.

You will see that Mr. Gray has worked out here nine passages. They are indicated by the titles in words above each section of the table: Tiny Tad, Nuisance, Brownie, Grasshopper, Open Well, Sand Hills, Ancient Ships, Ancient Builders, and Ancient Artillery.

If you will follow this table thru very briefly you will see the kind of results I am going to try to get here this afternoon and the grounds for my expectation that we shall get comparable results. These passages were used in the different grades. The grades are indicated over here on the left-hand side of the diagram. You see in the uppermost series three passages, passages which are relatively easy; in the second series are passages of the second degree of difficulty; and in the third series are the difficult passages.

Running over to the results we will merely glance for a moment at those lines which indicate the number of pupils that were tested in each of these cases. You see that a very considerable number of cases were employed for all of these different paragraphs: 118 in the second grade used Tiny Tad, and the passage marked Nuisance was used with

125 of the children. In the second column are given the words per second, that is, 1.16 words per second represents the rate of the second grade's reading of the first passage about Tiny Tad. The Nuisance was read at the same rate as you see, 1.17. Brownie is a little more difficult according to the results collected from these second grade children.

We come down to the middle passages. Here you see the results for the upper grades and you note that you have a more rapid rate of reading. That is, the children are now able to read 2.07 words per second in the Grasshoppers in the fourth grade. That is in part due to the fact that you are dealing with the fourth grade. It is in part due to the differences in the passage, but you have a more rapid rate of reading and again you can make comparisons between these different passages, and because you have the fourth grade in both of the different passages you can make a comparison between the easy reading and reading of medium difficulty. Thus you see that in Grasshopper the fourth grade reads at the rate of 2.07 words in a second. That same fourth grade read, as you see above, 2.4 words per second in Tiny Tad and in the other simpler passages.

In the Open Well, you have a passage read by the fourth grade again at the rate of 2.78 words per second, whereas the easy passage was read by these pupils at 2.13, that is, you have slight differences here. In this particular case you have somewhat more rapid reading of the Open Well passage than you did of the Nuisance passage. In that way we get some opportunity to compare the two.

We come down to this last row of passages, the Ancient Ships, Builders, and Artillery. Here you will see that the eighth grade reads at a very much more rapid rate than in any of the earlier cases. The eighth grade reads 3.06 words per second in the passage called the Ancient Ships while the Ancient Builders is read at the rate of 3.4 words per second. Here again you have the opportunity of comparison between the sixth and eighth in this group.

Mr. Gray selected these nine passages out of a series with which he began to work, and these passages were so nearly comparable to each other that he can make definite comparisons of pupils of all grades by requiring them to read the passages. If the Tiny Tad passage, for example, is given to a second grade which has not been tested heretofore, you have a background of results with which to compare this new second grade. Instead of calling his passages a scale, Mr. Gray uses the phrase "standardized passage," and I think he uses it with all propriety. The phrase means that one has a passage which has been used in various different grades, that has been used in various different schools, and we know something about it in advance, therefore it is standardized. You know what to expect, you know something about how easy it is or something about how difficult it is, and you know that because you have tried it out with a number of children. The advantage, therefore, of these passages in a new school would arise from the fact that you know something about them in advance.

I think that in general much of our testing could be elaborated if we got teachers sufficiently familiar with the spirit of testing to

realize that one can make tests of this sort without standardized passages. If third and fourth grade teachers both make use of some familiar passage out of the ordinary reading book, those teachers can then compare the rate of reading in those two grades without going into any elaborate investigation and without trying to get results from schools outside of the one school in question.

I am going to try you, if I may, with one of these passages, and in order to do that I am going to make arrangements to have put on the screen the Brownie passage, as it is called. This is a relatively easy passage. When I give the signal it will appear and I want you to begin reading as soon as it appears on the screen. I will stop you at twenty seconds.

Presumably the reading of that passage ought to require between forty-five and fifty seconds, so that presumably twenty seconds is short enough a period so no one will get thru the whole page. Some of you may be very much faster readers than I anticipate. In that case I may need to go down to ten seconds for the experiment, but I want you to read it with the view of getting the meaning of it, because, as we say to the children in the class, we expect to ask questions about it and we want you to tell what is in the passage. Furthermore, I want you to read it as rapidly as you can.

How many of you finished the passage? Then I was right in the guess that twenty seconds was a short time, for no one finished the passage. Did anyone read only into the seventh line? There are a few. Did anyone read only into the eighth line? Four or five, I see. Anyone read into the ninth line, tenth line, eleventh line, twelfth? Did anyone read beyond the twelfth line? Very well, now you have a very fair distribution group there, you see, with the beginnings in the seventh line. Then in the next line you get a large number and from that time on in the next three or four lines you get practically everybody bunched together. That is, we have a group of persons here who are fairly homogeneous, altho there are some individual differences. The average is about at the tenth line.

I am rather surprised that we did not get more individual differences than we did. We passed from the seventh line into the twelfth line; that is a difference of a little less than one to two. Ordinarily, in a group of this sort, we find that the differences between different individuals reach as high a ratio as one to three. That is, the differences in individual reading are very great. Of course, there must be some explanation of these differences and the very interesting question arises: What is the source, what is the cause of these individual differences in readers? Such questions will engage a good deal of our attention because we are not interested in making these tests merely for the purpose of getting the test made.

I want to warn you in general against being so absorbed in the numerical results which you get from your test that you do not think of the explanations which go behind and beyond the test that you are trying out.

I am going to give you another passage, but before I do that I am going to ask how many of you have been trying any of these tests.

Several of you; how many of you have given these tests yourselves? How many of you are at all intimately acquainted with the passages? Not enough to complicate my tests.

Please keep in mind, now, your record on the first passage. This was the third of the easier passages and I assume that it was not familiar to many here. I forgot to ask whether anyone had seen that passage before. One or two of you have seen it. At any rate for our purposes it can be regarded as an unfamiliar passage. Now I am going to give you a familiar passage. The Tiny Tad passage is one with which all who have given the tests are familiar. Tiny Tad becomes so familiar a character around the University of Chicago that he is really a family name. One expects to encounter him in any one of the grades to which he goes, and our children are getting very familiar with Tiny. Some of us are equally familiar with him, so I am going to put Tiny Tad on in exactly the same form as Brownie and then I am going to see whether those who are familiar get over this passage faster than those who are not familiar with it, because, in general, familiarity is a very important condition in modifying rate. I am going to give you Tiny Tad for twenty seconds and ask you to read it exactly as you did before, namely, with the view of answering questions about it.

Did anyone read less than the fifth line? Did anyone read only into the sixth line? Four of you did. Did anyone read only into the seventh line? Four. Did anyone read into the eighth line? Six or seven, perhaps ten. Ninth line? Tenth line? Three or four of you read into the tenth line; eleventh line, three of you into the eleventh line. Twelfth line? Thirteenth line? Did anyone read beyond the thirteenth line? You see the two passages are fairly comparable. We get results somewhat as we did before between the seventh and the twelfth line.

Now I should like to ask this question: How many of you read more lines in this passage than you did in the first passage that I gave you? Nine or ten of you did. How many of you who read more, that is, how many of those of you who have just raised your hands, were familiar with the passage? Seven. Seven out of twelve were familiar with the passage. You see immediately that the antecedent preparation of a student results in a faster rate. The lessons which are back of that sort of result are, I think, of a good deal of significance, because it suggests one method of cultivating rapidity in reading.

How many of you read less in this passage than you did in the first passage? I see three hands. Were any of you familiar with this passage? There was not one of us who read that passage slowly who was familiar with the passage, and out of the twelve who read this passage rapidly, more than half were familiar with the passage, so we have here a very definite item of explanation. Thus one can use these standardized passages for purposes of this sort of analysis. We can carry this experiment still further. Since this passage has been before you and you have read it we will try it again. In this case you certainly will have a degree of familiarity which you could not have brought over from your remote experiences. I am going to ask you again to try conscientiously to read the passage as if you were going to answer questions about it.

How many of you got more this time than you did before? There you see is a perfectly clear demonstration. You see the difficulty of comparing the results of reading tests in the fashion in which you compare the results of arithmetic tests. You can repeat all the numbers there are in arithmetic, and if you prepare an arithmetic test of the sort that Mr. Courtis has prepared you can, in your series of numbers, get every single possible combination. It is quite impossible for you to prepare a reading test of that kind. It is quite impossible for you to determine all of the different combinations of words and sentences that could be brought to children in these different grades, consequently your standardized passages in this type of investigation are not exhaustive tests. You cannot be sure that you have covered every possible phase of reading, but you can compare children in the degree of their ability to recognize the meaning of passages and you can get the difference between different kinds of passages and you can also go forward with certain experiments, as, for example, the experiment of making them familiar with the passage in various ways.

I am now going to give you another type of experiment, one which deals with another aspect of the matter of familiarity. I am going to give you a different type of preparation for one other passage.

I have a passage called Ancient Ships. I am now going to try to make it familiar to all of you by telling you what is in the passage. We are going to talk about ancient battleships and as we go into the matter we shall find that the majority of ancient ships were battleships. Apparently the ancients, when they built boats, were more interested in war than they were in commerce. There was a sufficient hazard, evidently, in going on the sea, so that they went only on urgent expeditions. They built some warships that were very swift and very large. We find that the Romans and the Greeks and Carthaginians had these ships and we shall certainly be very much interested in studying about them. But those who have to do with modern ships, who know everything about commercial ships or war vessels, are particularly interested in these boats, and the surprising fact about them, when we begin to study them, is that they were as good boats as they were.

So much for the preparation. This is the type of preliminary preparation that is very frequently taken up with a class. I am going to ask you after this to read the passage for twenty seconds as before. We shall then get our statistics again. Did anyone read less than the fifth line? Two of you. How many of you read into the sixth line? Quite a number of you, I should estimate it fifteen. How many of you into the seventh line? Somewhat less. How many of you read into the eighth line? A considerable number of you, about as many as read into the sixth line. How many into the ninth line? Six. How many read into the tenth line? Eleventh line? Four hands. Twelfth line? Thirteenth line? Beyond the thirteenth? Now we have it again, you see we read about the same number of lines. There is this difference, you will remember, from the original table which we borrowed from Mr. Gray, that this is a more difficult passage than the one we read before. How many of you read in this passage more than you read in the Brownie passage with which we started? Sixteen or seventeen

of you. Of those who read this passage more rapidly than you read the Brownie passage, how many were at all familiar with this passage from earlier experience than today's? Only two or three out of eighteen. Evidently training helped your reading.

I have seen very good fifth grade exercises given under practically the same conditions as these under which we are operating here. The teacher says to the fifth grade child, "I am going to give you a passage to read about such and such a matter and I want you to read it as rapidly as you can, then I am going to ask questions about it." I think this sort of experimentation with all classes would make very good routine exercises and one finds that one can in this way speed up children in their silent reading. For training in silent reading we have had until lately very little methodology. We have very good methodology for our oral reading, but we do very little of this sort of thing with silent reading.

I am going to ask you to read this passage a second time for the purpose of seeing whether the familiarity that you gained from exposure to this passage helps you in addition to the training I gave you a moment ago in reading this passage more rapidly. How many of you got beyond the thirteenth line? You see practically everyone here.

Next we will take a passage that belongs in the same category with this Ancient Ships, but is unfamiliar to you. I am going to put that on the screen in order to see how much you gained from the familiarity that I tried to give you by discussing the passage and the familiarity that you acquired from contact with this passage.

Did anyone read more of this than he read of the Ancient Ships? One or two. Now let us go back. I want to find out, if I can, how many lines of difference there are. Since you did not read more, you read either the same or you read less of this than you did of the Ancient Ships. I am going to ask you to show your hands on the number of lines less that you read in this second passage. Remember you had two chances in Ancient Ships; your first reading depended for its fluency on the instruction that we had about the passage in a general way. Please compare this reading with the first reading of Ancient Ships. How many of you read as much this time as you did in the first reading of Ancient Ships? How many of you read as much or more? Two or three cases. The rest of you now read less. How many of you read one line less in this case? About nine of you. How many of you read less by two lines? Seven. How many of you read less by three lines? Six. How many of you read less by four lines? One. Did anyone read less by more than four lines? Two. You see a difference of three, four, and five lines, due to the training that you got from a preliminary discussion.

The differences in reading which one measures by these standardized passages are sometimes due to outside influences, to the kind of influence that comes from familiarity, and when you use standardized passages for reading, you must recognize the fact that you are using up your material. The difference between a reading scale or a set of standardized passages for reading and the scale you use in arithmetic will, I think, be perfectly clear to you when you consider such facts.

I am going back to comment on some of the devices that Mr. Gray has employed in dealing with this passage as it is ordinarily used. A great deal of the material that is used in schools is not arranged so that it is easily tested. A teacher can overcome a great many difficulties if she will measure the time consumed in reading a passage by the device that we have just employed. We used, you remember, a constant time and you gave a variable number of lines read. Now we can exactly reverse that arrangement and try the experiment by isolating in the middle parts of this passage one hundred words. Mr. Gray has had the passage printed so that he has just one hundred words in the middle column, that is the fixed quantity, not the time as we used it a moment ago. When one thus uses a fixed quantity of material one allows the time to serve as the measure. You can use anything as a measure provided you will arrange your material in such a way that you get a definite result, a definite result that will be comparable with the same type of result in another case.

By printing one hundred words of this passage in a separate column we make it possible to determine with great nicety the length of time involved in reading one hundred words. There are certain other advantages which come from printing the columns in this way. In the first place, the preliminary short column gets the student under way in reading, a condition that is very desirable. Students need warming-up exercises and here is an opportunity for them to warm up. In the second place, you do not distract him in order to get him started. You merely start your watch when by watching his eyes you see him begin the one hundred words.

Suppose you had an ordinary reading exercise for the class and you wanted to measure the rate at which the children read. You can do it in the same fashion by noting quite unobtrusively on your watch when a child, who is reading aloud, is at a certain point, and what time it is when he ends. It is more difficult to do this when the pupil is reading to himself, but you can determine by watching his eyes when he is at the top of a page and then you can take his time again at the bottom of the page. You can make many incidental observations on children when they are working under ordinary circumstances.

One of the most entertaining and illuminating reports ever made in one of my classes was by a student who went to the library of the College of Education and observed some of the members of his own class reading. He went ahead of the members of the class and read two or three pages of an assignment that had been made to the members of that class, so that he knew how long a time ought to be required by a student to read a page of printed matter from that particular book. He then went down with his watch in hand, took notes on what happened, and came back the next day with a most entertaining account of what he had observed. What he observed ran something like this: It takes, say, three minutes for a very deliberate reading of one page. He noted by watching the eyes of his classmates that they began to read at the top of the page; they read down a little way into the page when they were distracted by something. The interesting question is: Where does the reader begin again when he comes back

to the page after a distraction? If you will watch his eyes you will see what is going on in his experience. Sometimes he rambles around and tries to find where it was he left off, when the distraction came; very commonly he goes back to the beginning of the paragraph. In many cases he goes back to the beginning of the page. You can observe his eyes and see that sometimes he runs rapidly over the part that he has read, sometimes he reads it over with the same deliberation that characterized his first reading. You can determine what is the character of his second reading by noting his time. If he reads it over rapidly, merely for purposes of locating the point at which he left off, you will know it by the short time required. In like fashion follow his other variations and delays. Thus you can take the sum total of the time he spent on the whole page. Instead of spending the three minutes that are necessary for a very deliberate reading of such a page you will find that frequently the reader will spend ten minutes and that ten minutes will involve a great many periods of so-called thinking about the last page.

Observations of that sort are of great importance. If a teacher wishes to answer the question as to whether all parts of a passage assigned to a class are of equal difficulty, let him set the children studying before him and watch them. Let him observe first a bright pupil and then a dull pupil and he will be able to discover by the rate of reading when the matter is difficult and when the matter is easy. If the ingenious teacher would do a great deal of this sort of work he would get the advantages of tests and measurements even when he is not dealing with standardized passages. We ought to get the teachers thoroly acquainted with the significance of this sort of work, because once they see that these symptoms which we are emphasizing in the test are real symptoms of successful reading; once we get them to realize that the testing of a passage is not something entirely outside of the ordinary routine of the schoolroom work, we shall have very much more intelligent testing to begin with, and in the second place we shall have an intelligent interpretation of what the children are doing and what the school is doing.

Suppose one finds that a child reads very slowly in a test. If the teacher has been using this method of testing all thru her routine work she will be in a position to understand that slow reading is a symptom of difficulty. If the passage is familiar, as we have just shown here in our own experiments, the student gets the contents of the passage very readily. Such experiments and conclusions give very important hints to the teacher with regard to methodology.

What would you do if you wanted to help children to read rapidly? What is the most obvious step that you can take? Evidently you can let the children read the same passage over several times and if the passage is read several times in succession there will be a gain in fluency, in rapidity of reading each time the child reads. I say I know of no better way of demonstrating to a group of teachers that the rapid reading which students exhibit when they are expert readers is directly connected with a higher degree of intelligence.

I should like to try one more experiment, and in order to try this

we shall use one of the passages of medium difficulty, one of the group which was used with the intermediate grades. I hope you still have in mind your record of the Brownie passage, the one we read first of all. Also I hope you remember your record for the Ancient Artillery which is an unfamiliar passage of the hard type. I am now going to give you a passage of the intermediate type.

How many of you read only into the fourth line or less? How many of you read into the fifth line? Six or seven. Into the sixth line? seven of you. Seventh line? How many into the eighth line? I should say ten. How many of you went into the ninth line? Tenth line? Three. Eleventh line? A few. Remember we stopped on the tenth line in the Ancient Artillery, so that is very good, and you remember some of you went to the twelfth line in the Brownie passage. How many of you got into the twelfth line in this case? Did anyone get beyond the twelfth line?

Now so far as the general averages are concerned, that turns out very well, that is, so far as the extreme cases at any rate are concerned. It turns out very well, because Brownie went to the twelfth and this went to the eleventh and the Ancient Artillery stopped at the tenth.

Now make individual comparison, if you will. Let us compare in both directions. First, with regard to the number of lines read in the Brownie passage, as contrasted with this last. How many of you read an equal number of lines in the Brownie passage and this passage? Five of you. How many of you read more lines in this passage than you did in the Brownie passage? Five. How many of you read more in the Brownie passage than you did in this one? Eight. That is about the sort of results you get. You never get in these reading tests, in fact, in any test, an overwhelming verdict in which every individual is involved. What you will get will be something like what we got here; you will get five or six persons who read equally even when the passages are known to be somewhat different in their weight. You will get a certain number of persons who reverse the expected results but you will get a preponderance which makes the mass result.

It is always a mass of results that you are dealing with in your first measurement. You can use these mass results for purposes of the type of analysis that we have been discussing before, but to make your study complete you must ultimately come to individual analysis. Comparing the last passage read with the Ancient Artillery passage, how many read the same number of lines in these two cases? Two. How many of you read more of the Artillery than you read of this? Eight. How many of you read more of this than you did of the Artillery? Fourteen. There again you see there are cases that reverse our expectations, but we get a preponderance of cases of one type in the midst of all this complexity.

Some persons are disposed to criticize the measurement movement in education, because they say one does not find as a result of these measurements anything about the single individual. I believe myself that we have to refine the methods of our measurement if we are going to get diagnoses that will help us in dealing with a single individual. But after all the school problem is a problem of dealing with a group

of children and any method that will help us to go in the classroom and determine in a general way what is going on in the group as a whole will be very significant for school administration. I should say, therefore, that these tests are immediately useful for purposes of school administration. Tests have been used for purposes of school administration more than for purposes of classroom methodology.

The distinction is worth drawing. Sometimes teachers are very restless in their work with these tests, because they are not able to see how they are going to improve their work by means of tests. I think we ought to acknowledge frankly that tests deal in their present form with mass facts. We ought to begin to extend these tests in such a way that we shall make an analysis of individual cases. I think the superintendent can use the tests, as they are now developed. Standardized passages must, however, give results which will show the teacher some return for her arduous efforts in carrying out these mass tests. In order to satisfy this demand we must go beyond mere massing of class averages. We must work out some experiments such as those on familiarity described above. You may be satisfied from the administrative point of view, with a gross result involving the group as a whole and showing a preponderance in one direction, whereas your teacher will want to carry that into more detail and will be interested in getting an individual diagnosis. Therefore, what I am going to advocate before you in some of the later discussions is an extension of these tests, a continuation of experimental endeavor in the effort to work out demonstrations that shall be helpful in modifying actual school practice.

There is one matter of methodology on which we should comment. There are two ways of checking up the children's retention of the passages which they have read. Either pupils may be called on to reproduce freely or they may be asked to answer a series of questions.

One of the most significant lessons that we get from all of our testing work with children is that they have only a limited span of attention. You must be very careful when you try a test not to overtax your child because the results you get after a child's interest and attention have been exhausted are very much biased results.

If you let a child read a story and ask him to reproduce what he has read, you will find in every case that the child will begin by reproducing with a good deal of detail what he found at the beginning of the passage. You will find that toward the middle of the passage he becomes briefer and briefer, and you will find that the end of the passage, which psychologically ought to be clearer in his thinking than the beginning of the passage, will be very meagerly reported.

One of the teachers in our school tried an experiment in order to find out the meaning of the fact on which I have just commented. She led the children thru the various steps which they must follow in going into the keep of a castle. The children were taken across the drawbridge, over the moat; they went thru the porticullis; they came into the court, into the doorway, and down the stairs into the dungeon. Then she asked for a reproduction. The pupils wrote in great detail how the traveler approached the moat, how he went over the drawbridge, how he got thru the porticullis, and then they began

to get very brief, and the trip to the dungeon was completed without very much ceremony. We should be mistaken in assuming that the children did not know about the end of the journey. This the teacher brought out very clearly by taking another class, giving them the same passage and asking them to tell how one would come out of the keep. This time it was the portcullis and the moat and the drawbridge that got short shrift. The pupils are not able to sustain attention for the end of any story. Their attention is worn out and that is why if you are going to estimate a child's ability to interpret passages you must not depend merely upon his powers of reproduction; you must in addition give the child some questions. The question is a device for distributing the child's attention over the whole passage. One cannot conduct a test properly and ignore the human factor that is being tested. You must recognize the fact that the result that comes out of your test is dependent, first, on the material that you offer the youngster; secondly, on the ability of the youngster to receive and retain that material; thirdly, on the ability that he will exhibit when he tries to reproduce the material; and you must take into account in your testing each one of these different factors. You must have the right kind of material to give the children; you must give it to the children in such fashion that it does in some fashion comport with their ability to receive that material; and then you must give heed in your testing process to the child's method of reproducing what has been given to him. In short, you have in your testing constantly to keep in mind the kind of internal processes which are called out by these tests.

Reading Tests

C. H. JUDD

I AM not going to talk about tests but about some supplementary studies that I think can appropriately be added to the tests.

After one has determined by means of tests where a weak reader is, or, on the other hand, after one has determined the grade in which best reading is done, or, still better, after one has determined his strongest individuals, then the problem is clearly opened up for detailed investigation.

We ought to take the individuals who can read very well and study them. Then we must take the individuals who read badly in order to find out what the difficulty is. In order to make clear to you the laboratory methods that can be employed in furthering these analyses (some of them are rather elaborate methods) I have brought along several photographic records of eye movements.

This particular film that I am going to show you is a strip of ordinary kodak film that has been passed mechanically thru a camera, in front of which sits a reader, in this case an adult. The reader is reading an ordinary passage, and the photograph indicates where his eye was at any given moment as he goes across a line. We have here that part of the film which shows the eye movement involved in a single line of reading. The line in the photograph shows the movement of the bright spot in the eye. Whenever you look at a person's eye you know there is a spot that you can distinguish as a bright spot. You see it in any picture of an eye, and in this particular case we have controlled the bright spot carefully by sending a beam of light from a proper source—an arc light—to the eye. When that beam of light is reflected into the camera it can be readily photographed, and whenever the eyeball moves backward and forward that beam of light travels. That is, the bright spot moves with the movement of the eye so that we have here a permanent record of the way in which the eye is doing its work as the reader goes along a given line. The film travels vertically, and the spot of light as you see traces a line on the moving film. Where the eye does not move, the spot of light is also stationary and we get a straight line or approximately a straight line. When the eye moves to right or left we get a corresponding line. The long jump shown at one point carries the eye to the beginning of a new line. You will notice that this line is made up of a series of dots; those dots are produced by placing a vibrating tuning-fork in front of the arc light; that sends the ray to the eye. This tuning-fork vibrates at the rate of one vibration every fiftieth of a second, so that each spot means one fiftieth of a second.

We are interested in following the eye as it reads a line of printed matter. Note that the eye pauses for a little time here while the reader

recognizes the word or phrase, then the eye moves forward, fixates another point in the line, jumps forward, fixates another point, and so on. By means of such a photograph we can determine the number of pauses that are made in a line; we can very readily measure the length of each one of the pauses, and we can see by projecting this on to the reading matter exactly where the eye was fixated at any given time. The other line that is on the film represents the check line. In order to make perfectly certain where we are on the printed matter, we fasten a bright spot outside the eye; this does not travel at all and gives us a continuous straight line.

Here is another slide which will give you a different kind of eye movement. Contrast the sort of movement that we have here with the sort of performance I showed you a little while ago. We have an eye movement in this case that is wholly different from that shown before both in the number and in the duration of the pauses, and if you go into it in some detail and measure the length of those various pauses, you will find that you are dealing again with a difference that is fundamental. The explanation of the slides is that in the last one the person was reading aloud and in the other he was reading to himself. In oral reading the trained reader usually looks at each word; he looks at a word and pronounces it, and so on. What he does when he reads silently is to take certain long steps; these are determined not by the demand that he shall move his vocal cords for each single word; the steps that he has taken in silent reading are determined by his ability to perceive or recognize certain combinations of words.

The unit is entirely different in the two cases. The unit in the first case is the unit of pronunciation, in the last case it is a unit of recognition.

Before we discuss the further details of this matter I want to run rapidly thru the lantern a number of slides that will show you certain other aspects of the situation. Here is a diagram that I borrowed from Mr. Gray. Mr. Gray tried the very simple experiment of seeing what the effect would be of asking the children to study the passage. If you give a child a passage to read and test his ability without any preliminary preparation whatsoever you will get the kind of a record that is represented by the full-drawn line. Let him study the passage, let him become somewhat familiar with it, and what is the result? If the passage is one which the child can readily comprehend because the words that are included in the passage are all of such a sort that he understands them readily, you get some such result as we got this afternoon. That is, this afternoon, you remember, when you studied the passage you improved in your ability to read. So here the children have improved in their ability to read. The lower part of the diagram shows what happened when the pupils dealt with a difficult passage. The interesting fact now is that when you tell little children to study a passage which is very difficult they do not do as well as they did before they had studied the passage. Tell little children in the second and third grades to study the passage and you get an effect which you see is exactly the reverse of the effect you get in the upper grades when the children study difficult passages. You are dealing here with the ability

to understand the passage, and when you ask children in the lower grades to study a passage, they do not know what you are talking about. They study the formal side, they learn more about the pronunciation of that passage, and they do not pay attention to the meaning of the passage. Consequently after little children in the lower grades have studied the passage they can pronounce it better, but they are not as efficient in understanding its meaning.

Two entirely different situations, then, arise in the lower grades and in the upper grades. You tell a little child to study and he thinks you mean to study how to pronounce the words, and he is distracted from a recognition of the meaning of the passage by attention to the formal side. You tell a child in the upper grades to study a passage and he knows that you want him to learn to interpret the passage. Thus we see that interpretation of a passage and reading a passage may be two entirely different matters. This is not unlike the fact which we discovered when we were dealing with eye movements.

Let us take up one or two other matters, and then we shall come back again to the general principles that are here involved. Here is a diagram [not published here] that was published in the Cleveland report. All of the children who were tested in reading in the Cleveland schools were divided in such a way that we have in the section across the top of the diagram the records of 25 children out of every 100. We have in the middle section of the diagram a representation of the record of 50 children out of every 100. We have in the bottom section of the diagram the remaining 25 children out of every 100. The horizontal levels represent different qualities of reading. That is, the 25 children at the top are the 25 best readers out of 100, that is the 25 per cent who understood the passage best. The mediocre 50 are represented in the middle horizontal division of the diagram; the 25 poorest readers in point of quality in the lower horizontal division. The diagram is divided into vertical sections in the same general way so that we have here the 25 children out of the 100 who are rapid readers at the right; the 50 out of the 100 who are mediocre in the middle, and the 25 out of 100 who are slow at the left. The diagram is put together for the purpose of showing us where the children are who are rapid readers and at the same time good readers, and so on thru the list. We find that out of 25 children who are good in quality 10 of them are among the most rapid readers. Eleven of them, you will notice, are the children who are mediocre in speed; only 4 of that 25 are slow in speed. Conversely, when children are poor in quality they are relatively seldom rapid in speed.

What does that mean? It means a good many things. Two statements, perhaps, we can select from the many that ought to be made, and they are these: There are some children who will be very good in quality, but they are slow in speed because they are temperamentally phlegmatic. The slow, steady child is good in quality; he does his reading well, but he is slow in speed because he is slow in everything that he does.

In our school at Chicago we have been working with poor readers. We have had a girl in the fifth grade who is very slow in all of her

reactions; she is very steady, she does her work well, but nature did not make her capable of unlimited improvement in speed. There will be in every class a certain number of children of that sort, and it is important in dealing with these tests and with the results of our ordinary school work that we recognize that there are individual differences which express themselves, as indicated along the upper section of our diagram. There are certain differences that nature has then provided; that is one fact that can be stated with perfect clearness.

The other fact which we ought to emphasize as of major importance is this: When a child cannot read well he is doing something that is analogous to that which he does when he stumbles physically. He is intellectually clumsy and clumsiness requires time. If I should try to walk from here to the door, and in doing so got in my own way, if I stepped on myself and was otherwise very clumsy about it, it would take me a long time to reach my destination. On the other hand, if I can go from here to that door without in any wise interfering with myself, I shall do it rapidly. The more rapidly I can get from here to the door the more economically I shall carry on my work. That is the typical fact in reading. The child who is slow and clumsy, who gets in his own way intellectually, will be a child who will not be able to carry away any of the meaning of the passage. That is what is shown in the lower section of the diagram where one sees the children very slow in speed, poor in quality, not at all like the pupils who are slow in speed but good in quality. Those children were phlegmatic; these are undeveloped.

Carry this statement back, if you will, and relate it to the fact on which we touched at the very beginning of our discussion. When you try to read orally you are engaged in doing something that interferes with the reading process, because if you are reading orally you must gauge your eye movements to correspond to the rate of your vocal apparatus, and your vocal apparatus is relatively very much slower than your powers of apprehension. The result is that when you are reading orally you are making yourself do another piece of work that gets in the way of your understanding. You find that you are very much more rapid in your silent reading, you are very much freer from distraction because you do not have to wait for your vocal cords; you are very much better able to get the significance of the passage. Does not this throw light on the sort of training which we ought to give in the schools? We ought to train children in the mastery of silent reading because it is the efficient rapid form of reading, free from distraction, free from the necessity of those slow laborious eye movements.

I have another diagram which I want to put on the screen. It is a familiar record to many of you; it shows in the full-drawn line the record of the group of schools which Mr. Gray uses as his standard. The broken line shows the record for the Cleveland schools.

If we parallel this record of quality with another record which shows speed and if we then add the record of oral reading in the Cleveland schools we have a full explanation of the whole situation. Cleveland emphasizes the formal side of instruction and neglects to train in the apprehension of meanings.

The evil results of this lack of emphasis on meanings becomes most evident in the fourth grade. This is always a crucial grade. The primary grades ought to prepare a pupil to read for meaning. If anything goes wrong in the primary grades, the fourth grade will reveal the trouble in most acute form. If, on the other hand, the work of the primary grades has been well done, the fourth grade will show a type of interest in meaning which calls for special recognition in the instructional methods used in the schools. Formal training should begin to give way to greater emphasis on meanings.

Four sets of facts have been laid before you. First, you have been shown that there is a striking difference between oral and silent reading in the type of eye movements involved and the time consumed. Secondly, there is a radical difference between the way pupils in the primary grade and pupils in the upper grades study passages. Thirdly, rapid rate and fluent reading show in general a high grade of ability while slow reading is usually clumsy reading. Fourthly, whole school systems may show an overemphasis on the formal side of reading.

These facts were brought together for the purpose of showing that the reading process is a complex one and that teachers, if they are to deal intelligently with pupils, must analyze this complex process and deal with each aspect of reading with full knowledge of what is involved. Oral reading is different from silent reading; clumsy reading must be overcome. Emphasis must be on meaning.

I would encourage you by every means in my power to make tests and more tests, but your results will profit you little if you do not turn instantly to the analysis of school situations and to the study of methods that shall improve reading as it appears in individual pupils. The testing movement must affect practice.

Experiment in Education

C. H. JUDD

I HAVE great respect for the capacity of an interested audience. The amount of education material that has been launched in your direction today seems to me to be prodigious, and whether you are prepared now to enter on anything like the discussion of a new theme I seriously doubt. I sympathize with the comments of my good friend Professor Strayer. Of course we realize, those of us who are enthusiastic about this survey movement and about the experimental movement, that in the minds of many the wisdom of this movement is seriously questioned. I heard the verdict, briefly put, by one of the victims of the survey movement. A man who all along had felt that the survey was not needed in his system and shortly after the survey had been completed was judged by the school board not to be needed by the school system, said: "Surveys are good things; they give employment to a certain number of persons who would otherwise be public charges."

It is not without opposition that this scientific movement is going to work itself out and I should like to be able, if I can briefly, to try to reconcile two notions about scientific work in the schools that in the minds of some persons are antagonistic. I deem this opportunity a suitable one for this statement, because, as we all of us realize, we are greatly indebted to the head of this institution for having carried on one of the first great experiments of a laboratory type in education. I also appreciate the opportunity of expressing to President Bryan the personal satisfaction with which all students of the science of education refer to his investigation of the telegraphic language. Every time I teach a class in educational psychology and commonly whenever I make an address, I have occasion to refer to it as one of the most substantial, one of the most illuminating, one of the most interesting examples of the possibility of a laboratory experiment with educational applications. If we recognize that experiment must in some measure be carried on in the laboratory; if we recognize that it is possible for scientific method there applied to give us suggestions that can be carried out in school work, I believe we must also recognize the fact that it is possible for experiments to be made in schools which are thoroly scientific in temper, which come back to the laboratory student with suggestions that are full of lessons for his guidance.

Every teacher who is progressive in schools is experimenting. Not every teacher who is progressive in schools is experimenting scientifically and, therefore, there arises in the minds of some of our educational persons a feeling of opposition between the laboratory student who works at some special problem and the investigating teacher who is eagerly working out some new method. Can we not join these two forces in a single type of scientific undertaking; can we not say to the laboratory

student "You should carry out in some detail this and that investigation, but you must so present your results that these results shall be useful in guiding educational methods"? And shall we not say, on the other hand, to the aggressive teacher who is experimenting with methods of teaching reading or some form of discipline in the school, or other practical problem: "You are also a fellow worker with the scientist in his laboratory. What you need is to follow your investigation with that keen spirit of criticism that is characteristic of the scientific laboratory and you can turn your results, collected in the classroom, into the finest type of scientific material."

I believe there is no fundamental opposition between that body of practical experience which is being collected by our educators and that type of scientific inquiry and criticism which we are trying to work out in this new professional movement, which we are here to represent and celebrate.

Let me offer, if I may, two or three illustrations. I came here to discuss reading; if you are not tired of reading, I am not and we shall try that again. I am willing to discuss reading all the time, because I am perfectly certain that reading is one of the fundamental subjects, if not the fundamental subject, in the schools. Our American schools are reading schools and they have been reading schools from the beginning. I like in this period of nationalism, when we are trying to define the spirit and temper of all that we undertake in this country, to come back to the conviction that we are making a definite contribution to the world's culture by the type of schooling that we have developed in the United States. If you go to the common school in Europe and observe the method that is employed in instruction in those schools, you will be led back logically and necessarily to the historical beginnings of those common schools and you will find that they were catechism schools. You will find that in those catechism schools of Europe the instruction was given by the teacher by word of mouth and the questions put by the teacher after instruction had to do with types of information accepted from authority.

If, after making that observation, you come back across the Atlantic, you will find that when our Puritan forefathers established American schools they said one thing was necessary. They said every individual child shall be brought into direct personal contact with the source of all religious belief and they established schools for the purpose of teaching children how to read the Scriptures. When they established schools where children shall themselves read the Scriptures, they put an end forever to that type of training that depended upon authority, that type of training that meant that the child must learn exactly what is stated by authority and must repeat verbatim what authority has given. When these children back in old New England began to read and when later that reading matter which constituted the limited subject of instruction in the New England school began to expand so that it included ultimately history, civics, and science we had the unmistakable signs of a growing democracy. The spirit of Puritanism which made of American schools reading schools where the child shall formulate his own opinion in direct contact with the sources of material prepared the

way for the growth of independent public opinion as it has never been prepared for by any other device of civilization.

I, for one, am perfectly willing to talk about reading all the rest of the day, and I think the problems of reading can be used admirably to show what is going on in the laboratory and to make clear the practical significance of laboratory experiments. At the same time it is easy to draw a great body of suggestive scientific material from the experiences of teachers of reading who are training the children in the schools. If from these two points of view we see the possibility of developing a scientific method of treating reading which shall improve the work of our schools we shall have ample justification for the scientific movement which we represent.

When we try an experiment in the laboratory we take reading material and print it in fine type and in middle-sized type and in large type, and then we ask someone who can read to sit before a camera and read this identical passage in three different kinds of type in order that we may find out how he does it.

You say that is a ludicrously simple performance. Yes, but let us be patient and see what the results are and see what are the implications of these results. When a trained adult reads the same passage in three different kinds of type, he reads those passages in exactly the same way. Think that over and I believe you will begin to realize that it means a great deal.

Let us use a few psychological terms if you will. Suppose the reading process was concerned primarily with sensations. Your psychologist means by a sensation the impression that is produced on the eye. Suppose reading were a process controlled by sense material, how would a person read if he got a great deal of sense material from large type in one case, and very little sense material from the fine type in another case? If reading were a process controlled by sensations we should get a different kind of eye movement with each change in type. We should get a different kind of reading process when the type is large, when it is middle-sized, and when it is small. But we do not get different types of eye movements. We get the same kind of reading process; we get the same number of pauses.

I dare say one could increase the type to such a size that one would have to look at the individual letters. As I go down the street and see an illuminated sign I sometimes have to stop and spell it out. I am not talking about those extravagant enlargements that are involved in such a case; I am talking about enlargements which double the type.

Our results show that the trained adult is not controlled by the sense material. He is concerned with what we call in our technical psychology "a perceptual unit". A perceptual unit in reading is something that is determined by what the reader brings to the reading process. When I read an ordinary passage and am trained in the reading process I take in at each glance a certain unit from the page and when I move my eyes to the next position I take another unit. How large a unit can I understand and apprehend? Just so large a unit as I am prepared by my experience to take in. We have long known that the unit of perception for a little child is different from the unit of per-

ception for an adult. The unit of perception grows in the course of experience. We have perfectly definite evidence of that, and when you come to an adult who has learned how to read you find that he has a unit of perception which is so superior to sense material that he is not controlled by such sensory units as letters or even words. He has the reading within him. His units are determined by what he contributes.

Let us see whether there is any kind of change that we can produce in our reading matter that will change the unit of perception. We can do that very readily. All one needs to do is to ask a person to read numbers and one has a situation that is wholly different from the situation set up when one asks a person to read sentences. No one can read numbers in large groups. Even a trained adult cannot do it. Stand before a long series of numbers and photograph the eye while reading single numbers as 8, 7, 6, 5, 4, and so on and the result shows that the eye rests on each number. Now group those numbers together and say 876 and you will find that the perceptual unit, even when you read 876, is a very small one. It is not always a single digit, but it is very commonly a single digit even in a trained adult who tries to read numbers. The reading of numbers is perceptually a wholly different process from the reading of words. You see what I mean by a perceptual unit and do you see the possibility of modifying a perceptual unit by the kind of material that is presented?

May I offer another illustration? Suppose I take letters that do not constitute words and throw them together in a miscellaneous way and try one of the experiments that has been common in the psychological laboratory, the experiment of marking out.

The common experiment requires one to take a miscellaneous line of letters and mark out the a's. The subject grows very skillful in recognizing the a's but even here he does not take in at a glance the large groups that he does in reading. For the reader letters are grouped into words, but when one is looking for a's one cannot group letters. When one is looking for a's one has changed the motive entirely. The perceptual process involved is an entirely different process from the reading process. I might go on and elaborate that indefinitely.

You can get a different result in reading if you tell a person in advance that you are going to ask him to answer questions and you want him to read very carefully. He goes about his reading in a fashion that is wholly different from the fashion in which he goes about his reading when you merely tell him to read. Thus we find that we can go to our laboratory, and if we study a trained adult, we find that the reading process in the trained individual consists in a very large measure in what the individual brings to the situation and we must define the various kinds of reading processes according to their different motives and different types of material.

You say the teachers have known this all along, and I think they have half known it all along. They have half known that there is a difference in the reading process when you have one motive behind it and when there is another motive behind it. There is a fundamental difference in the way in which a child attacks a page when he is going to read merely for the purpose of the pleasure he is deriving from that

reading and when, on the other hand, he is going to read for the purpose of preparing to answer questions.

We have known this fact in the schools, but have we known in the school how to induce those changes in a fashion that shall comport with the demands of human development? Have we known at what grade one can ask a child to exhibit this internal process of mastery of reading situation that shall make it possible for him to change without distraction from large type to middle-sized type, to small type? Have we been able in writing our primers to determine what is the size of type most useful for school work? We have indeed determined some of the gross hygienic demands with regard to size of type, but have we determined the best mode of arranging this material so that it shall be recognized by the child without disturbing his mode of recognition?

May I use a very simple analogy, one that you can observe with any child? You and I can write and do write with the same kind of handwriting, whatever the position in which we stand. My handwriting is characteristically the same whether I write from a position that I now occupy before this desk, or whether I rest my arm on my desk as I do under ordinary conditions. I can write in a cramped position; I can write on a poor piece of paper; I can write my characteristic type of handwriting under almost any circumstances that you can set up for me. Why? Because I have the habit within me. I am the master of my writing habit. These external conditions may disturb slightly that habit, but there is so much momentum back of that habit that I am master of almost any situation in which I find myself.

Did you ever try the experiment with a little child who has just been writing for a little time? You will find if you change the tool which he uses in his writing, or if you change his position with reference to the writing material, you modify his form of handwriting so as to get a characteristic difference. He does not have the handwriting habit within him.

When my colleague, Dr. Freeman, makes an investigation of adult handwriting he expresses his results in the technical terms, "I find a rhythm in the handwriting of one who has acquired the ability to write. I find certain individual methods of coupling the letters together. I find that the long practice," he says, "of training in handwriting has given to the adult a mastery of certain combinations of letters so that he no longer writes the letters as separate units, but he writes them as large coördinated combinations."

What is true of the mature writing habit is true of the mature reading habit. The pupil learns by long contact with reading matter to come to the reading situation with certain internal habits that cannot be disturbed. You disturb the reading habit of an adult a little if you turn a book bottom side up, but the disturbance does not last for any great length of time. You disturb the reading habit of an adult a little if you print your lines vertically instead of horizontally, but the disturbance is not great. Try that same experiment with a child and you find the child is absolutely without the preliminary habit of perception that makes it possible for him to master easily the novel situation.

Such discussions lead very naturally to a practical school problem.

We are led to ask, When does that period arrive in which a child has mastered reading enough so that you have a right to describe him as a matured reader? I think you all know the answer to that in a vague general way. Somewhere in the fourth and fifth grades the child has "arrived," he has gone thru the drudgery and training of those primary years, usually he has gone thru some sort of phonic analysis, and has learned laboriously how to couple together his letters and words into sentences and phrases. He has mastered the art of pronouncing these symbols which he sees on the printed page; and there will come a time inevitably, in the fourth grade or fifth grade, when as master of his own habits he is no longer willing merely to learn. He wants to apply his habit. He wants to do something.

Our laboratory experiment shows us how critical is this period of change for it will be remembered that with every change in motive of reading there comes a change in its form. The laboratory, when asked what it means that the pupil has matured a habit, has cultivated a unit of perception, will answer, He has developed an individual mode of attack upon the printed page. The laboratory will give you many a suggestion which I think will make it clear to you that you have a right to describe that child as having passed a crucial point in his intellectual development. Now go back to the school and you find that every intelligent teacher begins to realize that somewhere in the middle of the school, in the fourth and fifth grade, you must have a different method of teaching. You must have a new method of dealing with these children.

In the fourth grade it is no longer true of the child that he gives attention to the sensory materials offered by the page to his eye. It is no longer true of him that he must devote his attention to the mere mechanics of reading, because at that point the child has a mature habit of perception. We find him ambitious to use what he has cultivated and we ought to give him an opportunity to do it. We ought to change our methods sharply, clearly, definitely, and then we shall have a scientific mode of procedure in our schools that will correspond to the laboratory experiment.

Such adjustments will make us scientific because we are at once practical and thoughtful. We shall have no antagonism between these two types of investigation. We shall not have a practical school man saying to the laboratory investigator, "Your researches are remote. They are described in language which we can not read." We shall have, on the contrary, eager inquiry from the teacher as to the period when this change takes place. We shall hear eager inquiry for some detailed description of the kind of change which has taken place, for a description which will illuminate and make clear this experience that all along has been vaguely apprehended by our practical educators. At the same time we shall bring it to pass that the laboratory man is investigating not because he has come on some interesting phase of human nature, not because he is satisfying his own curiosity and his own demand for a problem that he can work out as a part of a remote and distant science; but we shall see the laboratory man coming over into the school

and realizing with enthusiasm that human experience has been accumulating in the school which is of importance in defining his problems.

I have used the illustration of reading, I have referred to handwriting, may I use briefly in closing one other illustration? We have been trying in recent years tests in arithmetic. We have been finding great differences as the most characteristic results of all of our tests.

One of my good friends, Mr. Uhl of Northwestern University, has recently added to the type of work which we are carrying on in these tests a kind of investigation that seems to me to promise very much. He has made an intensive study of the children who are unable to solve some of the problems. With the keen insight of the scientist he has gone with such a child to a quiet place where the scientist and child together can work out their problem. He has watched the child as the child succeeds in solving some of the easy problems. He has noted when the child begins to have difficulty and when the child has difficulty with a particular combination he has made that the subject of his study. What does he find? You give such a child the problem nine plus five, and find as your first superficial result that the child is slow in solving that problem. Often the teacher concludes we must give him some more drill in solving that problem, so the teacher says to the child, "Nine and five, how much is that?" He tells you by and by the answer. Then you try him again and he tells you the answer, but you know, if you keep a scientific record, that he does not improve. Why not? If you bore a little way into that child's consciousness, this is what you will find out. He is saying to himself, "Nine plus five; that is too complicated. I am not going to be able to deal with that. Let me see; five has a two in it and another two in it and a one; nine plus two, plus two, plus one is fourteen." As soon as Mr. Uhl puts us on the track of such facts as these we have a new view of the case. When you try to get that child to drill himself, he drills himself more and more with the two and the two and one and if you sit blindly by and simply drive that child to do it again you will build up a habit that will become so fixed that by and by when the child faces a five he will always try to analyze it. The child may think this is perfectly rational. Perhaps some good teacher did it once; perhaps some good teacher said to this child, "Break up a five into a four and a one and you can add a one to nine and get ten, then you can get fourteen." The child says to himself, "I will do a little more of it." So instead of breaking up nine plus five into a nine and a one and a four the child has added, if you please, two two's to make the four still more picturesque than the teacher thought of making it. Mr. Uhl reports a child who had a most astonishing method of subtracting nine from forty-six. I doubt whether you could imagine a more complicated method if you tried to devise some curious intellectual by-way of doing this work. The problem was nine to be subtracted from forty-six. The pupil said to himself, "I take away one from the forty-six and then I shall have five times nine, then I get rid of one of those, and four times nine is thirty-six, but remember I have to add one in order to keep the equilibrium."

I believe that for a long time to come we shall have to have some one with keen scientific insight sit down beside that child and go thru

life's intellectual complexities with him and leave behind a record which the child himself is not competent to leave. It happens now and then that he can tell us what his difficulty is, but more often he will be following some devious path in his effort to solve intellectual problems and will be utterly unable to tell us about it. It is our business to devise the method that shall make it possible for us to understand and describe what that child is doing even when he cannot tell us what the difficulties are.

This type of difficulty has undoubtedly existed in every schoolroom where arithmetic has been taught, since the day that the three r's came to be the foundation of our education. Unnecessary analysis has been going along with counting on the fingers, but we have been able to see the counting on the fingers while we have had no refinement of scientific method such that we could observe in detail what goes on where the fingers do not appear and manifest themselves to us without scientific method. The scientist will have to contribute to practical experience in order to elucidate what practical experience has contained, but has not been able to see.

We must use in all fields of human endeavor the best methods that we can employ to look into the intricacies of life and then we must frame our method of procedure in the light of these revelations. Experiment in education means the development of those methods that shall make it possible for us to see what is going on in pupils' minds, and having seen what is going on to try this method and that method of meeting the situation until we shall arrive at solutions that will make the pupils more efficient. We must have measurement in order to understand where we are. We must have analysis in order to understand the processes with which we deal. We must have experiment in the classroom in order to devise methods of improving conditions and we must follow the new methods with new measurements which shall determine how far we have made progress beyond the point of our beginning. When we are thus scientific, when we bring to bear upon our practical problems every scientific device that we can develop, then there will be no breach between the laboratory investigator and the practical teacher, but there will be one common cause and one common interest, because our educational work will be established on sound scientific principles applicable in practical life.

Round Table: Reading

Led by C. H. JUDD

I DO not know what the difference is between a round table and the other performances, unless, as your chairman suggested, you have some questions to ask.

VOICE: I am very much interested in one question that you brought up yesterday. It is apparent from the figures before us that we in the first three grades are giving too much attention to oral reading. I think the figures prove it. You proved your case all right, but we are not doing in the first three grades what we should do along the line of silent reading. I wish you would amplify that subject and show us what we might do to better that condition. The historic work done in Brooklyn, Kansas City, Cleveland, and other places in proving the method of teaching reading, beginning back in the years when Ward was in the work, has led to this condition of excellent oral reading in these cities, and a lot of other cities that have followed in that study. Oral reading is far superior to what was done before on that side, but these figures indicate that oral reading work has been carried so far that it appears to be formal and contemplative, or silent reading has not been developed in those three grades. You made that point very clearly yesterday, but I should enjoy very much, and I think others would, to hear the remedy discussed.

MR. JUDD: Now, I think the problem before us can be approached by asking one general question, Why do children come to school only after they have reached the age of five or six? That is true all over the world. What does it mean? I think the answer is this: A child can come to school only after he has acquired enough language so that he can be relatively independent in society. Prior to that time the family has to look out for the youngster and see what his needs are. The child has not enough language to go to an institution. He cannot express himself, and he cannot understand what is said to him. The child is ready to come to school at five or six years of age when he acquires a stock of oral language. When in the first grade we begin to teach him reading, a new form of language which he does not acquire, naturally, in the home environment, we must begin with the oral language that he brings. All the training we give in the first years must attach directly to that which the child contributes. He brings oral language with him, and since we want to teach him this other form of language, we must take advantage of that which he brings.

In the early years we are working to bring together the written symbols and the oral language that the child contributes, and there must be a certain emphasis on the mechanical process of bringing together the printed symbol and the child's oral language. We have had

a good deal of difficulty in deciding the units in which we shall do it. The great advance made by the Ward method, to which you have referred, was that the Ward method said, "The unit that will help us to bring together the child's oral language and the written symbol is not the letter." Obviously, the oral language that the child brings has never been broken up into letters. The language which the child is to acquire may ultimately be broken up into letters, but that is not the natural division. The natural division, as we print words now, is a word; consequently the Ward method made a great advance in teaching the child a word as a picture, and relating it directly to the oral word, which is of course the unit. The Chinese have done that from the beginning. They have a picture for every word, and they have never tried to make an analysis in the written symbol, beyond the point to which it has been carried by the oral speech. The Chinese draws the picture of a word; the relation is perfectly simple. The word method failed at first because it did not recognize the fact that ultimately the children, in order to learn to spell, must analyze written symbols into letters. Teachers found in the early days of the word method, when they did not pay any attention to the analysis of the words, that children who had reached the fourth and fifth grade could not spell. They accordingly adopted a modification of the word method which makes a phonetic analysis of these words, that does not break the word up, first of all into letters, but breaks the word up into certain familiar sounds: it, bit, sit, knit, all that sort of thing. It is a unitary sound; that is an effort to take the sound analysis which is easily related to a letter combination.

The mechanics of relating sounds and written letters is so absorbing to a great many teachers that they spend a great deal of time with children in phonics, drilling them and getting the combination between sound and letters fixed. They fail to realize that there is a new problem the moment one goes beyond the child's oral speech. It is all right when you are teaching a child in terms of primary grades, merely to rely on what he brought with him in oral speech. In the primary grades it is a matter of relating letters and sounds, and not a question of giving him new information, not a question of using this reading matter for the purpose of intellectually going beyond what the child can bring, and does bring from home.

Very shortly, however, your reading matter begins to extend beyond the child's experience. Now, you have an entirely new problem; it is the problem of teaching meaning. This problem must be taken up with care. Gray found in St. Louis that they were going more slowly with their reading in the lower grades, but laying great emphasis on accuracy and recognition of meaning, while in Cleveland they are absorbed in going as fast as they can, without paying attention to meaning. I am going to venture, if I may, to call on Mr. Gray. He came down here to see what you are doing in Indiana, but you ought to see what he does about these things, too. Won't you tell them about that difference between the methods in St. Louis and Cleveland?

MR. GRAY: It is just a little difficult to try to make a table clear, when one has not the figures before him and will be speaking more or

less in the abstract, but those of you who gave the oral reading test will remember that two sets of facts were recorded in regard to the reading, in each paragraph, namely, the number of seconds required to read, and the number of errors. We have summarized for St. Louis and for Cleveland the average number of seconds required to read the paragraphs.

Let us take, for concreteness, Paragraph 1. "A boy had a dog; the dog ran into the woods," etc. There were about fifty words in that paragraph. I cannot give you the exact number of seconds required by the two schools, but beginning in the first grade Cleveland made a record in speed which was distinctly superior to the record made by St. Louis in speed, and as you follow the grades, from the first to the eighth, successively, you will find that this superiority in speed is maintained thruout the city system on the part of Cleveland.

On the other hand, when you summarize the errors which were made you will find that St. Louis is as distinctly superior to Cleveland in accuracy as Cleveland was superior to St. Louis in speed. Now, I think we may summarize that by saying that teachers consciously or unconsciously emphasize this or that phase of instruction. City systems do the same thing, and, as far as these two qualities are concerned, you can see that St. Louis was giving more specific attention to the accuracy and content side of the material rather than to the more formal element, namely, speed.

I would not underestimate the importance of speed, because it is highly essential in securing speed or facility in silent reading, but to the extent that that mechanical phase of the work is emphasized or overemphasized, it becomes a detrimental factor, of course, in the progress of the work.

MR. JUDD: That is the point. There is a body of very interesting empirical evidence to show that if you give your attention primarily in the lower grades to accuracy, detailed recognition of the words, and the securing of the meaning, you are laying a substantial foundation for later reading. Witness what comes ultimately in St. Louis; they are distinctly ahead in the lower grades. There is a temptation to get up fluency of oral reading, and to give your whole attention to that. If you will check that a bit you will ultimately get all the speed you want, as witness again St. Louis. You get all the speed you want, and also the other very desirable characteristic, and I think Mr. Gray's point is much to be emphasized.

If you go into a city with a system of reading which is primarily a phonic system, you commonly find that teachers are emphasizing the ability of the children to pronounce words and read fluently, whereas it would be better if these teachers recognized that the main thing is to teach these children to read for meaning. We must have the fluency; we must get pupils to analyze their words, but we must have accuracy and interpretation.

One must begin with oral reading in the lower grades, gradually emerging from that in the fourth grade, taking up at this level a great deal of accurate, meaningful, silent reading. Then I should gradually

drop off the amount of oral reading in the upper grades, say the fifth and sixth, reducing it greatly in amount, not spending five times a week on an oral reading exercise, but utilizing some of those oral reading exercises as opportunities for silent reading. Children learn to be rapid readers silently only when you give them an opportunity to do it, and I think the fallacy in our present procedure in reading is that we make reading an exercise where it is always oral reading, and always a kind of public ceremony, whereas we ought to offer the pupils an opportunity for silent, meaningful reading.

In the seventh and eighth grades I shall let the children bring in some exercises that they are interested in reading to the class. I should not have all of the books uniform thruout the class, but I should let the children come in with material that they want to present; that is, a real oral reading exercise.

VOICE: Could not that material be introduced earlier than the seventh grade?

MR. JUDD: By the time you get to the seventh grade, I would not have anything else, if you please. Down in the fifth grade, I think it is entirely proper to have all the children with books in hand, reading some of this material, and perhaps criticizing each other in the reading of the material.

I saw an excellent piece of work in the matter of oral work in a high school near Chicago. The teachers picked out all the children who were failing in the first year in that high school, Cicero High School, and they said, "These children are failing primarily because they do not know how to express themselves," so they grouped them together into one class to emphasize English. In this class each child had a set of cards with a full list of the class. Each member was given some theme on vocational opportunities for boys. These themes were presented to the class. Every time a child got up to recite all the members of the class took out their cards and if he stumbled or looked up at the ceiling or looked out of the window or hesitated, they wrote a note and said, "Johnny does not do his work well because—" and they put down the reason. This came to be a record of why each child was not doing his work well. But much more than that, when the boy who wrote the criticism got up he remembered he must not do those things for which he had criticized his fellow-members. Toward the end of the year when I saw them they sounded like an ordinary group of children reciting extraordinarily well; they had been saved by being given an opportunity to criticize each other.

I should say in every sixth grade you ought to have some opportunity to let a child stand before a class and read, then the class ought to have an opportunity to say, "I couldn't hear," or, "I think that could have been done thus and so." They will thus become intelligent by making comparisons between members of the class. They will do this very well if the material is new and interesting, brought in by the pupils as suggested above. The ordinary sixth grade reading exercise is one of the most solemn failures that you can possibly face, every child with the same material before him and nobody caring anything about it, nobody

criticizing anybody else, simply proceeding thru this ordinary routine. It is not a reading exercise and nothing except a bore to everyone concerned. If you are going to have oral reading let it be genuine oral reading, for the purpose of criticism or conveying information, but emphasize a great deal more methods of accurate silent reading meanings in these upper grades.

MR. BLACK: Do you think that the relative amount of oral reading in the lowest grades, say first, second, and third, is too great?

MR. JUDD: I think probably not. The oral method is the only possible method there. There might be more attention to the beginnings of silent reading. If you will analyze a primer you will make up your mind exactly why it is written as it is. There has to go on the first page something familiar to every child who takes it up, because on the first page the child cannot get any information. You will find the first page of a primer presupposes the ability on the part of every child to pronounce every word that is there. The trick is to show him that he does know, and he must see this word, and then he must relate it to something already prepared. The first page of a primer aims to relate known forms of experience, known forms of articulation with unknown written symbols.

I am in favor of the teacher recognizing that fact and making her own primer. Some of the best primary reading I have ever seen the children and teachers prepared when they came in from the garden, or something else, and the children, knowing what they want to say, will have the matter written on the board by the teacher. I have seen that multigraphed. That should, it seems to me, become a common thing. I should make a book for the children. I think you can make the best primer that can possibly be made, and then it will be meaningful, and then the children will get hold of the idea, and reading and meaning all go together. Oral reading of this type seems to me most appropriate for the early grades.

The teacher must pass now to another kind of reading, reading for new experience. This, too, should at first be done in a coöperative way. The teacher should say, "Here is a book about something we haven't seen; here is something that tells you about people living in Greenland or the people who live in Africa; we can't see them but you can find it here in the book." By and by you will find the reading naturally glides over into the silent informational type, provided you have utilized the social opportunity provided by oral reading to the limit. I think we should make reading a genuine, practical concern, directly connected with the ordinary experience, so I should be willing to say, Professor Black, that if you will utilize reading for meaning in spheres where children are prepared to apprehend the meaning you can very readily get a body of material that may emphasize meaning without having to go out of your way to do it, because you will get the mechanical work done in the early grade and by and by you can transfer that directly into the field where you want to get the meaning without having to emphasize the mechanical side of the process.

MR. BLACK: Where would you begin to decrease the amount of oral reading?

MR. JUDD: Third grade; I am perfectly clear on that. The third grade in the ordinary school is a place where a child has learned to read enough so that he can be intellectually aggressive, and by the time he gets into the fourth grade I am perfectly certain that he ought to be doing a very large amount of reading by himself. At first he ought to be guided by the teacher in the methods of silent reading.

The third and the fourth grades are the periods of transition. I think the reason why the fourth grade is the point where children begin to do something different from that which they have done in the primary is that during the three years the child has been learning how to read, and now he is relatively independent when he comes into the fourth grade. What does that mean? In terms of my discussion last night this means that the perceptual unit gets larger and larger with the result that in the fourth grade a child runs rapidly along with his eye and attention while his vocal cords are struggling along behind. As a result he will stumble in his oral reading. Whenever your attention is ahead of your performance your performance will begin to be bad; consequently in the fourth grade many children seem to be stumbling in their oral reading just because they have learned to get far ahead of the vocal apparatus. The ordinary teacher will say to such a child, "You are stumbling in your oral reading; therefore you must stay in the fourth grade and learn to read orally," when the real fact of the case is that the pupil is stumbling in his oral reading because attention is running ahead of the oral performance.

It is perfectly obvious to me that the child ought to have an opportunity to go ahead and read silently. If we are going to have this oral reading in those upper grades, fourth, fifth, and sixth, and so on, it ought not to be for the purpose of interfering with the child's reading, but purely for the purpose of expressing ideas to other people. We do not read orally for the sake of getting the meaning; we read orally sometimes for the sake of social comparisons of interpretations.

You can have children study geography lessons orally. You get them to read over the geography and you can bring out fine shades of meaning. Will you allow me to tell a personal experience which was very impressive to me? I remember when I was a college student, Professor Winchester, my teacher in English, asked me one day to read from *Hamlet*. I am sorry I cannot give you the exact quotation, but after Hamlet had seen the ghost, and the ghost says, "Remember me," Hamlet wants to tell him he will. Hamlet's answer has in it two lines which begin with "Remember thee." "Yes," he says, "I will remember thee after all my other faculties are gone." "Remember thee." "Why, I will remember you after I have forgotten everything else." Now, those two phrases look exactly the same in the printed matter. "Remember thee." "Yes, so long as I have any faculties I will remember thee. I will remember thee as long as I remember anything."

I did not see the different meaning; I said, "Remember thee; certainly I will do that." Winchester said to me, "Are those 'Remember

thee's' just alike?" I looked with an entirely new view on that passage. I think that was good oral reading for a college class. It checked up what I had not done. I had not got that meaning. When it was over I knew I did not have that shade of meaning.

Once in a while I think you have to have an oral exercise to bring out values for the child, to give him the opportunity for interpretation. Oral reading in the upper grades is not for the sake of teaching me to read. I could read, but I could not interpret the oral reading exercise.

I do not think we ought to have the interpretation exercise confined to one hour a day. I think we ought to have interpretation and, if necessary, a little oral reading to bring out interpretation in the geography class or history or in anything, but the purpose of such oral reading as we have in the upper grades ought to be to supplement interpretation, not to work out mechanics of reading.

May I add this further comment? If instruction in the mechanics of reading is not over in the third grade you are in trouble because when you get a sixth grade child who does not have the mechanics of reading, you have a serious problem because that child will not give attention to the mechanics of reading. The little child down in the lower grades does, he is anxious to imitate the teacher, and he is extraordinarily social. The fifth grade boy is not so social. The sixth grade boy is not social at all; he is not docile at all, and if he cannot read now it is very unlikely that you will be able to get from him that kind of laborious imitation which a little child is always willing to contribute, as the background and foundation of reading. You cannot get imitation in the sixth grade if you do not have it in the lower grades. I think we ought to lay a great deal of stress on getting the mechanics of reading in the lower grades where the children are able and willing to do it, and then in the upper grades we ought to make use of that material and not be trying to get it in its primitive form.

VOICE: In what grade should lip reading be eliminated?

MR. JUDD: Lip reading is characteristic of slow readers. Clumsy, ineffective readers always have an excess of oral performance going on. Perhaps you have seen someone who cannot write trying to compose a letter. I remember very distinctly helping a friend of mine who is a gardener to write a letter. He wanted to write the letter and all I was to do was to help him, and I remember seeing that chap sweat over a letter as I should have sweat over spading his garden.

Writing a letter is a colossal performance. If you have not done it for some years and do not know the mechanism you can get up just as much friction doing that sort of thing as you can doing any genuine piece of work. The same sort of thing appears in reading. If you take a person who is utterly untrained in reading and he has to get something off the page, you will see him set all the machinery he has in motion to extract that meaning from the page.

Once in a while I sit opposite some man on the suburban train who feels it necessary to get a piece of information out of a newspaper, and it is really worth the price of admission to ride down with him and

see him go thru that operation. He is absolutely absorbed in this paper, working it over with all of the motions that he can possibly put into his lips, sometimes even reading out loud.

The person who cannot read well will overwork; the person who has not learned to read will show much vocalization. Where I find a child who has a great deal of it, and some of them have it even in the high school, I regard it as a symptom of bad reading.

VOICE: In order to overcome that symptom, when should a conscious effort be made to eliminate lip reading?

MR. JUDD: I come back to my general formula: Wherever you find it, it is a symptom of incomplete reading. You have to find it in the first grade, because that is the only kind of reading of which the first grade is capable. I should expect a little less in the second; in the third grade, it ought pretty largely to disappear, if the training has been right. In the fourth grade, I should be anxious; in the upper grades I should regard it as a positive defect.

Oral reading is entirely appropriate in the first grade, but diminish it in the second grade. In the third grade it is reasonable to expect a little of it, but you ought to begin to be anxious in the fourth grade. That comes back again to the general formula. You ought to get a child in such a condition so far as reading is concerned in the third grade so that he can attempt any reasonably interesting material without excessive facial and vocal cord movement.

In the experimental laboratory we find that no one is entirely free from traces of vocalization. If you put a little rubber bulb in your mouth between your tongue and the roof of your mouth and carry off that tube to a recording apparatus, you can see how unstable your tongue is. If you begin to think intently you get a more active record. If you begin to read you will get some excitement shown by the involuntary movement from your tongue; if you try to read French or German you get a good deal of excitement. When you are thinking fluently and smoothly and working in a field where you are thoroly trained, you get very little movement. The more you get rid of that movement the better. If you are working in a field where you are less and less and less expert, you will get more and more movement. There is almost complete parallelism between the two.

Practical Results Obtained Thru the Use of Standardized Tests in School Achievement

C. H. JUDD

THERE are three types of activity that I think we have to carry out if we are going to make measurement of school results effective. First, we have to persuade the teachers that they need to do it. I am not at all sure that we have laid enough emphasis on that part of it, so I have put a few diagrams on the blackboard that I think could be used and have been used in some quarters in the effort to persuade teachers that they ought to measure something. To these I shall return in a moment.

The second part of the program is to make the measurements. Someone has called it the diagnosis of the situation. Finally, I think we are agreed at this conference that there is a third part of the program, which is to go out and use the results of the measurements as a means of doing better. I am going to deal more especially with the first part of the program because I do not think we have talked about it very much. I am going to try to show how we can collect evidence which will make it clear to teachers that they ought to make these measurements. I have put down here the tables. In the city of Cleveland 17 per cent of the children in the first grade fail of promotion. The reason why I would like to begin with this sort of a fact is that the teachers made that fact. The teachers recorded that fact, they recorded that judgment of their own work. You do not have to make any new measurements, you say to the teachers that according to their records, 17 per cent of the children in the first grade in the city of Cleveland fail of promotion, which means that in the minds of the teachers of that city something has gone wrong with 17 per cent of the children.

I am not blaming the teachers at all, mark you. Perhaps that which has gone wrong went wrong before the children came into the first grade. Very frequently it does. The fact without explanation is that something went wrong with 17 per cent of the children in the first grade. In the second grade 12 per cent of the children fail of promotion. That is a better situation than the one in the first grade, and the teachers know it and the teachers have recorded that the situation is better. It is a perfectly natural expectation on the part of anyone who investigates this matter that he will get further improvement as the grades go forward.

If 17 per cent fail in the first grade those who get into the second grade ought to be better adjusted to their work and apparently they are, so we have a failure of only 12 per cent. Now, the astonishing fact in the city of Cleveland is that when you get to the third grade a

larger percentage of children fail than in the second grade and when you get to the fourth and fifth grades a larger percentage fail than in the third grade. The figures are 14 per cent, 15 per cent, and 18 per cent. That is what teachers said about it.

You do not have to import any test or outside measurements. Certainly something has gone wrong when the children who are attending school in the third grade fail to the extent of 14 per cent which is in excess of the percentage failing in the second grade. When that percentage steadily increases up to the fifth grade you do not have to debate it very much with the teacher that there is something to investigate.

I believe if you would try in all the schools of this state to tabulate the judgments made by the teachers you would get something that would furnish an excellent basis for any one of these studies. The teachers of Cleveland had not been made aware of these facts. To be sure they were in the annual report printed year after year, but they were printed in a fashion that did not bring out their meaning. What was printed in the report was the aggregate number of children who fail in the first grade, the aggregate number who fail in the second, and so on, and no one noticed the fact that the percentage of nonpromotions was increasing in successive grades. The simple device of putting their own results to them in a form that made comparison easy brought to their attention the situation which they had neglected to observe.

You might follow the table beyond the fifth grade, where things begin to improve a little, but not very much. In the sixth grade it is 17 per cent, in the seventh grade 16 per cent. You see on closer study that the apparent improvement does not amount to very much because there begins to be a heavy elimination in the fifth grade. The children who are not getting on well disappear and when you have here 17 per cent in the sixth grade, it is in reality a bad figure.

It happens that in the city of Cleveland we had a very good opportunity to carry this investigation one step further, because in that city they had kept very careful records of a variety of different sorts and they had especially a record of failures in particular subjects. So we have a record of the failures in reading, 14 per cent of the children fail in the first grade in reading. This is practically the same number that fail of promotion. In the second grade only 10 per cent fail in reading. This is a great improvement; indeed, it is a little more than the improvement which we see in nonpromotion.

Continuing the reading record, we see that in reading they are satisfied with the work which they do in the third grade, for only 6 per cent fail; in the fourth grade, only 4 per cent, and so on. All this shows great satisfaction on the part of the teachers with the work done in reading. Reading goes all right. The children who are going to have difficulty are eliminated in the first, second, and third grades, and from that time on there is very little difficulty.

The Cleveland survey shows that the satisfaction on the part of the teachers was not well founded, because as a matter of fact while they were getting on very well with the formal reading, they were doing very badly so far as comprehension was concerned. But without

disputing about reading you can go to these teachers and say there is something wrong with nonpromotion. Your reading seems to be all right, but is there justification for your assumption that your reading is all right? Notice your reading does not agree at all with your nonpromotion tables. If you say in nonpromotion, as you do, that the children are stupid and ought not to be promoted, and say in your reading table that the children are all right, they can read, you have something to explain.

That is a little longer form of the argument, you see. You cannot go at first to those people and criticize their reading; you have to say to them that they show satisfaction with their reading, but that satisfaction with the reading does not agree with their dissatisfaction as shown in the nonpromotion tables. The discrepancy was brought out in an impressive way in the case of the Cleveland report, because the teachers had been committed by an ancient practice not only to reporting nonpromotions, but to the reporting of the causes for nonpromotion, and they had set down solemnly why their children were not promoted into second, third, fourth, and fifth grades, and the reason that they had set down was "mental incapacity".

Mental incapacity is a fine omnibus phrase. If you do not want a child to pass in a school and need a phrase with which to explain it to the parent, you call the parent in and use such a phrase as mental incapacity and the parent goes home either satisfied or dissatisfied, but he is not likely to continue the argument. You have, if you are a student of schools, the interesting fact that children who are nonpromoted for mental incapacity are an expense to the city of Cleveland because they had to do that work over; they certainly were bored by doing the work over, and not likely to get much out of it. Here was the grim humor of the situation; the teachers were calling a lot of children incapacitated individuals on the mental side and yet were promoting them so far as reading was concerned.

I say it is a little longer argument, but after you have carried the argument out there are very few persons competent to teach in schools who will not see that there is something to be investigated when the nonpromotion table says one thing and the reading table says another.

In Cleveland we can go a step further. They had recorded as I remarked the percentage of failures in all of the other subjects. I have only one other here on the blackboard and that is arithmetic. In arithmetic no one failed in the first grade, they do not have very much; very few children fail in the second grade, again they do not have very much. Twelve per cent fail in the third grade, where it is beginning to be a serious issue; 14 per cent fail in the fourth grade, 17 per cent fail in the fifth grade. There must be something wrong about arithmetic or else with these children, but we have evidence that the children are all right, because they can learn to read. We have a background now for a determination of what is wrong.

It is not the children in this case. Anyone who can read and continue to read grade after grade and do it very well cannot be regarded as seriously intellectually defective, so that when you find that your arithmetic is getting to be so steep a hill intellectually that these chil-

dren cannot climb it, either arithmetic is very well taught and reading is badly done or reading is well taught and arithmetic is badly done, and you can take your choice. Perhaps arithmetic is right, in which case reading must be wrong, because these children are certainly not being handled in the same fashion in reading and arithmetic. Furthermore, the arithmetic failures are a very impressive fact, because they look very much like the nonpromotion table in general.

The point I am trying to make, please remember, is that you can persuade teachers that there is something to investigate if you will take their own returns and put them together. I never knew it to fail. Make a tabulation of the teachers' records and you can deliver to them the foundation for any investigation you want to undertake.

I have put on the board one other set of facts. Here is a diagram from the city of Grand Rapids, worked out in exactly the same way. The nonpromotion curve for Grand Rapids begins very much like the Cleveland curve. It is up here in the first grade, drops considerably in the second grade, but from here on it drops below 10 per cent in the third grade, then oscillates around 10 per cent with some advantage in the upper grades. That is a great improvement over the Cleveland situation. In the main you can say that in Grand Rapids they do not fail to promote their children to anything like the degree exhibited in the Cleveland returns. But now here is a very interesting fact. Their reading curve looks very much like the Cleveland reading curve, in fact, it is almost identically the same kind of a situation, and the further interesting fact is that their arithmetic curve looks just like the Cleveland arithmetic curve, in fact, it is a little worse than the Cleveland arithmetic curve. What is one to say about things of that sort? I will give you the answer.

Get the problem clearly in mind. You have two great municipalities, handling children by the thousands. In one case reading is regarded as satisfactory. In the other case reading is regarded as satisfactory. In one case arithmetic is regarded as unsatisfactory. In the judgment of the teachers of the other case arithmetic is equally unsatisfactory, but one municipality promotes its children so that they have an average of about $4\frac{1}{2}$ per cent better promotion than they have in the other municipality. You see that means a matter of a good deal of importance to some children, because that means a year of schooling. To the city of Grand Rapids the gross results are enormously important as a mere matter of financial economy. Grand Rapids is ahead of the gross results in the city of Cleveland. The reason Grand Rapids is better in nonpromotions while the same in reading and arithmetic is that they have an administrative device in Grand Rapids that covers all their sins. They have trial promotion. If they encounter difficulty with a child in arithmetic in Grand Rapids, instead of keeping him back as they do faithfully and consistently in Cleveland, they say, "O. well, let him have a trial," and the interesting fact is that he succeeds with the trial. Do you see what they have done by an administrative device? They have covered up a course in arithmetic which evidently needed correction. The Grand Rapids course needs correction just as much as the course in Cleveland needed correction.

I have been trying to show you that you can get teachers to understand that there are problems to be worked out only when you lay before them their own results, and by a comparison of their own results make it perfectly clear to them that there is a problem to be studied.

Studies of this type are very useful in aiding administration. I know a young high school principal who went to a high school that was perfectly satisfied with itself. Perhaps some of you have encountered institutions of that sort. The faculty was entirely satisfied that it was one of the best faculties in the United States. If that young principal going to that high school had canvassed the various recitations and had called one after another of these teachers into his office and said, "You are a very bad teacher," you know what would have happened to that principal. He was young; he was light-hearted; he went into that job not realizing what an encrusted high school faculty he was going to encounter. What did he do? He did not argue with the individual teachers. He went and got the statistics in the neighboring university for a period of four years of the work done by the graduates of that institution. That was not all he did. He got the similar statistics from three of the rival high schools and what came out was really amusing. The Lord was with him in that matter and delivered the Israelites into his hands. He made a comparison of the record of his school with those of the three hated rivals. He hung the tables on the board for faculty meeting, that was all. There was no argument between that young principal and that faculty. He said, "Ladies and gentlemen, I have been very much interested in the work done by this school. I regret to point out that our neighboring schools which are so inferior to us in point of equipment of the faculty have made a record so superior to ours. Perhaps there are items we can consider at subsequent faculty meetings. I will leave the charts here. The faculty is adjourned."

Again I come back to my point. You must convince your teachers that you have something to discuss with them. You cannot profitably begin the discussion until you have created that preliminary conviction that you have a right to debate the matter. Twenty-four months ago, you could not have had a debate with Cleveland about its reading. Today it is almost literally true that you can meet any man on the street and have a debate with him about school matters. The people are all convinced that something ought to be done. They see the necessity of doing something because their own records show that necessity. The survey did not merely find out something by methods of measurement imposed by scientific students; it made an effort first and always to bring it about that the people should be convinced by the fact that their own records showed that something was not going well in that school system. This then is the first chapter of any reform. Persuade your teachers by means of various records. The second chapter about making the measurements is familiar. I am therefore going to close with an outline of the third chapter.

The measurements which we make are useless if they cannot be applied to class work. Too often measuring tests are looked on as ends in themselves. They are not ends. If they show that reading is not

well done, the insistent question which teachers have a right to ask is, What are we to do to correct the defects? Our inquiries must go on so as to bring new suggestions which will help the teacher.

Some of the steps of this further movement I have tried to point out in my earlier talks. May I go further and tell you some of the possibilities which I believe the future holds?

I am going to give you a few of our ambitions, if you please, rather than actual achievements. I look forward to the time when we shall have a clinical description of educational difficulties, analogous to the clinical descriptions that we have in medicine.

If you study medicine you will find that doctors will tell you typhoid is so and so and they give you some of the general outlines of typhoid, but they will also say to you, "Don't make the mistake of thinking typhoid is the same thing every time you come in contact with it." Typhoid has many forms. Every patient who has typhoid is a unique subject of scientific investigation; there is a type of typhoid which is thus and so; there is a type of typhoid number two which is thus and so; there is a type of typhoid which is number three. We will give you the clinical description of number one and number two and number three and number four and you must learn not to treat typhoid all alike, because there is a difference which justifies our clinical description of number two as distinguished from number one. Your treatment must recognize that same distinction. Some day, I am sure, we shall see bad reading classified in our educational files exactly as the doctors classify typhoid.

Today we cannot do it as fully as the doctors do it with typhoid, but I can give you two or three brilliant illustrations of clinical descriptions. I know three children who never learned to read until they were thru the first, second, and the first half of the third grade. They were not imbeciles and everyone in contact with them was very much confused about those children, because they seemed to be perfectly normal children, in fact, they did the work in arithmetic that was taken up in those lower grades but they could not learn to read. You can find like cases written down in the literature of pathology; you will find that the neurologists have described children who at first cannot learn to read but later undergo a sudden cure.

Do you know what the explanation of some of those cases is? It lies in the fact that a bright child arriving in the first grade, full of new interest, distracted by the richness of all the new experiences that are around him, refuses to bother with little black marks on a white page. He does not see why a human being should pay any attention to those things. The teacher cannot get his attention for reading at all; he is not interested in it. You try to say to him, "Read this thing," and he is more interested in something else and he will proceed to do it. When such a case comes into the hands of a teacher who is responsible for thirty, forty, or forty-five children in the second grade and the first grade, it is neglected. If such a pupil wants something out of a book there are many persons around to tell him what was in it. Children of this type are interested in a story, but when they were asked to participate in the difficult problem of producing the story it seemed

to them to be a work of supererogation and they refused to learn. The cases which I know were about to be adjudged defectives by the city department of child study, but they had the great good fortune, because they were about to be classified in that way, to fall into the hands of a very skillful teacher who looked them over and said, "If I could interest the children in r's and a's and b's and c's, maybe they would learn to read." So she said to them, "Children, let's draw some pictures, let's make a picture of a man." She drew a round circle and put two legs at the bottom. She did not go any further. "This is a man and he can run. See whether you can find him on this page anywhere." They found a capital R. Soon she had the children looking everywhere for capital R's and after all if you want to approach the matter in that way R's do look like the head of a man and two legs running around. Perhaps you never thought of doing it in that far-fetched way, but that skillful teacher found the device effective in showing these children that there is something interesting on a page. She did not say to them, "Your future depends on your ability to extract information from this page." She said to those children, "See whether you can find one of these chaps running around." Then she said, "Did you ever see a ball that you can roll? It is here. I will put it on the blackboard, a round ball. See whether you can find some on the page." The children found any number of round balls rolling around the page.

One of those children, described by a long pathological term of neurology as suffering from developmental alexia, learned to read in three weeks. Of course, he had had some of the necessary preparation for reading, he had been maturing in a place where reading was going on, he had all of the information necessary for interpretation, but he refused up to that time to bother with these little black things on a page.

I have given you three extreme cases, but there are hosts of children who are half unwilling to pay attention. There are a great many children who are only partially impressed by the example of the school-room and the example of society. We assume in the school that the children are eager to read; we assume that they are going to have the foresight to look into the future and understand the value of reading. But this is assuming too much. There are some children lively, distracted, perfectly normal children, who do not take on this habit in the early years, and you have to devise very frequently special methods for them, perhaps not as artificial as the ones I have described, but you have to describe reading to such children in terms that will appeal to some trivial momentary interest.

Do you realize how artificial reading and writing really are? If you do not realize it hunt up sometime the archives and see what writing was in the Elizabethan period. That is not so long ago historically, but the clumsy, ugly, uncoördinated forms of letters written only by the aristocracy in those days will leave in your mind the very firm conviction that reading and writing are relatively very new arts, and that the world's history has been made in a very large measure by people who did not regard it as worth their while to pay any great attention

to this extraordinarily artificial kind of material that we offer the children on the printed page.

I have described one kind of a bad reader. I want to give you another kind of a bad reader, and I will keep the promise about that time of closing. This second type can be described by the technical phrase which I will use, if I may, as having "a very short span of attention". There are at least two distinct reasons why a person has a very short span of attention. I will give you an illustration or two. One often finds a girl in the high school, a conscientious, normal girl, who gets most of her lessons, but whose parents complain about home work; they say she finds it very arduous. The case of which I knew came to live with her uncle; the uncle became concerned because this child did not seem to be able to do the home work as other children did, and brought the child around and said, "I should like to know what is the matter with the child." We took some measurements. The child could not read at a rate that compared favorably with the reading in the fourth grade. Of course, the child was troubled with assignments. She could reason, she could understand ordinary words and ideas. So we put a special teacher at work with this child, not so much for the child's advantage in this particular case, as for the sake of our diagnosis; we wanted to find out what the difficulty was. We tried to speed up the child in reading. "But," said the girl, "if I read rapidly like that I shall not hear the words." Do you see what the difficulty with that girl was? She had been brought up to read orally every word that she read and her span of attention was limited to hearing and speaking each word. The trouble with that child was an overdose of oral reading.

The second reason for a short span of attention is that pupils do not know the words. The words look unfamiliar and the pupils stop to look at each letter. They make an elaborate visual analysis of words which they ought to recognize as wholes.

These few cases must serve my purpose. The treatment in each case must fit the special difficulty of the particular pupil. It would be as foolish to classify all these children together as poor readers as it would be for the physician to classify all sick people under one head and give them all the same treatment. In the schools as in medicine we need to learn to discriminate and classify. Then we shall fit the treatment to the difficulty and our scientific studies will issue in productive practice.

A Study in Arithmetic (Courtis Tests, Series B) in Indiana Cities

H. L. SMITH, Dean of the School of Education, Indiana University

AT each of the four annual conferences on Educational Measurements held at Indiana University (1914, 1915, 1916, and 1917) some emphasis has been placed upon the measurement of achievement in the fundamentals in arithmetic. From the very beginning the purpose back of these arithmetic discussions and studies has been twofold: first, that of finding out the actual conditions; secondly, that of determining methods of improving conditions not found to be satisfactory. The one purpose is that of exhibiting a picture. The other purpose is that of building, on the information contained in this picture, the scaffolding that will support improvement. It has been the purpose, too, in all these four years to correlate as nearly as possible the work of the conference held in the spring with the individual studies made, during the year, in a coöperative way with various school systems thruout the state. This year an effort has been made to effect a still closer correlation between these two activities. To this end we are reporting at this meeting summaries of studies that have been in progress during the year. These studies will be analyzed more in detail later on, but the large conclusions are available at the present time. A special effort has been made also this year to connect the two fundamental purposes of all these studies, namely, the purpose of revealing conditions and the purpose of remedying these conditions. To this end you will notice by the program that we have arranged for both Dr. Strayer and Dr. Judd, in at least one address each, to emphasize by concrete examples the beneficial results following the revelation of conditions by tests. Up to the present time emphasis has been laid primarily upon revealing conditions. This represents only the first step in what should be done. Unless the work goes farther than this, it will be of comparatively little value. The problem of the future is that of discovering just how to make conditions better. There is some value, of course, in simply blindly but stubbornly attacking the problem of improvement in the hope that some good results will ultimately be evolved. Only slight progress, however, can be made without accurately controlled experiments in different ways of improving the various phases of the arithmetic work. Those of you who have been attending these conferences in the past will remember that a few attempts have been made looking toward constructive work. Especially will those of you who have been reading the individual arithmetic studies published by Indiana University recall that Professor Melvin E. Haggerty in his 1915 study entitled "Arithmetic, a Coöperative Study in Educational Measurements", throws some light on the significance of the time spent on arithmetic, of the time

of beginning arithmetic, and of the degree to which arithmetic teaching is supervised, in effecting achievement in this subject. In the 1916 publication there are two studies on the effects of drill: one by Miss Mary Kerr on the effects of drill in addition as carried on in the Bloomington schools; another by Mr. Herman Wimmer on a comparison of progress made with drill, and of progress made without drill in arithmetic. This experiment was carried on in the Bremen (Ind.) schools.

It was the hope to continue this type of study a little more elaborately this year [1916-17] and at the beginning of the fall general suggestions for investigation along this line were made in a bulletin setting forth the outline of work as contemplated for 1916-17. It was found impossible, however, to make the contemplated studies on the effect of drill in arithmetic, owing to the fact that because of the uncertainty in the paper market publishers could not guarantee the materials in time to make the study as planned.

The second purpose in the arithmetic study for this year was to continue previous studies of conditions in Indiana and to discover if possible the progress made since the beginning of these tests. The first part of this purpose has been realized. The second part was impossible of realization because of the fact that the cities that made the tests in the various years were not at all the same from year to year. Of the twenty cities that gave the test in 1914-15, only eight gave it in 1915-16; and of the twenty-two cities that gave it in 1915-16, only three gave it in 1916-17. Only one city has continued the test in coöperation with this bureau for the three years. More of the cities that had given the test previously indicated their desire of repeating it this fall, but upon learning that the time of giving the test would have to be postponed on account of the inability of the publishers to furnish the tests when they were expected, they changed their plans. Other cities gave the tests and made use of the results independently of this bureau. The cities and towns included in this year's list, while larger in number, are much smaller in size than those included in each of the previous lists, so we have a picture of conditions in an altogether different type of school system this year from what we have had before.

In the year 1914-15 returns were obtained from only one city with a population under 3,000. In the year 1915-16, returns were received from six cities and towns with a population under 3,000. In the present year, however, returns have been received from twenty-two cities and towns with fewer than 3,000 inhabitants. In 1914-15, therefore, towns of 3,000 inhabitants or fewer represented only 5 per cent of the total school systems reporting, whereas in 1916-17 approximately 80 per cent of all the cities and towns reporting were under 3,000.

In the summary of the Courtis Arithmetic tests that has been made for this meeting the returns from twenty-seven towns and cities were used, involving a total of 5,472 pupils.

In connection with this year's study in arithmetic I wish to make briefly three types of comparison: first, a comparison of the Indiana standard for 1917 with the Courtis standard and with other state standards as far as they have been worked out up to the present time. You will find four graphs among the exhibits in this room setting forth

this comparison, one graph for each of the fundamental operations. The second comparison is a comparison of the 1917 Indiana results with the results obtained in Indiana in 1915 and in 1914, and the third is a comparison of the 1917 achievement of each of the four groups of

TABLE I

THE INDIANA 1917 MEDIANS IN ATTEMPTS AND RIGHTS COMPARED WITH THE COURTIS STANDARD AND WITH THE IOWA (1916) AND KANSAS (1915) STANDARDS

	ADDITION		SUBTRACTION		MULTIPLICATION		DIVISION	
	Speed	Rights	Speed	Rights	Speed	Rights	Speed	Rights
<i>Grade 4</i>								
Indiana 1917	5.9	2.6	5.6	3.4	4.1	2.6	3.0	1.1
Iowa 1916	6.2	3.5	6.8	5.0	5.8	3.5	4.2	2.5
Kansas 1915	5.8	3.0	6.4	4.1	5.2	3.0	3.8	2.1
Courtis	5.6	5.0	6.0	6.0	5.0	5.0	4.0	4.0
<i>Grade 5</i>								
Indiana 1917	6.3	3.5	6.8	4.7	5.6	3.3	4.0	2.2
Iowa 1916	7.4	4.6	8.2	6.6	7.0	4.9	5.5	4.1
Kansas 1915	7.0	4.3	7.9	5.9	7.0	4.8	4.9	3.3
Courtis	7.0	7.0	8.0	8.0	7.0	7.0	6.0	6.0
<i>Grade 6</i>								
Indiana 1917	7.0	4.2	7.8	5.8	6.6	4.4	4.8	3.2
Iowa 1916	8.5	5.7	9.7	8.0	8.6	6.5	7.0	5.8
Kansas 1915	8.1	5.3	9.1	7.4	8.1	6.2	6.5	5.5
Courtis	9.0	9.0	10.0	10.0	9.0	9.0	8.0	8.0
<i>Grade 7</i>								
Indiana 1917	7.7	4.9	8.9	7.2	7.9	5.7	6.5	5.2
Iowa 1916	9.1	6.2	10.7	9.0	9.9	7.7	8.5	7.5
Kansas 1915	8.7	5.8	10.0	8.3	9.0	7.0	9.3	8.1
Courtis	11.0	11.0	11.0	11.0	10.0	10.0	10.0	10.0
<i>Grade 8</i>								
Indiana 1917	8.6	5.7	10.4	8.2	9.2	6.8	8.4	7.0
Iowa 1916	10.0	7.2	12.0	10.6	11.5	9.3	10.8	9.8
Kansas 1915	9.8	6.9	11.5	9.9	10.9	8.9	10.1	9.3
Courtis	12.0	12.0	12.0	12.0	11.0	11.0	11.0	11.0

Indiana cities with the 1917 Indiana state standard. For this comparison the cities are grouped on the basis of population.

The first comparison, namely, that of the 1917 Indiana standard, with the Courtis standard and with other state standards, is made with each of the four fundamental processes both as regards the number of problems attempted and the number of problems correctly worked

(Table I). In Addition the Indiana achievement, as far as number of problems attempted is concerned, is distinctly lower than the Courtis standard in all grades and noticeably lower than the Iowa and Kansas standards in all grades. As far as the number of problems worked correctly is concerned, Indiana 1917 achievements are lower than the Courtis standards or other state standards.

In Subtraction the Indiana 1917 achievement is distinctly lower than the Courtis standard or the other state standards in all grades in number of problems attempted, likewise in all grades in number of problems correctly solved.

In Multiplication the Indiana 1917 achievement in number of problems attempted is lower in all grades than the Courtis standard and the Kansas standard, and in number of problems correctly solved the same thing is true.

In Division the Indiana 1917 achievement in number of problems attempted is lower in all the grades. In problems correctly solved it is lower in all grades.

The second type of comparison is a comparison of the 1917 Indiana achievement with Indiana achievements in the years 1914 and 1915 (Table II). The accompanying tables give the Indiana standards by grades and by years both in number of problems attempted and number of problems correctly solved in each of the four fundamental operations.

In practically every grade in every fundamental operation the 1917 records of achievement are distinctly lower than those of the years 1914 and 1915, especially those of 1915, which are on the whole higher than those of 1914 and which compare very favorably with the Courtis standard and other state standards. The explanation of these differences, of course, will be one of the significant problems to be worked out in the future. It may be that the 1915 increase over 1914 may be partially accounted for by the fact that eight of the cities included in the 1915 test were also included in the 1914 test, and had presumably attempted during the interval to bring up the work in arithmetic. The 1917 returns are from a wholly different and smaller group of towns and cities, and a future analysis of the conditions in these cities compared with conditions in the cities furnishing returns for 1914 and 1915 may reveal some probable specific causes for the low results this present year. This very fact, however, is a clear instance of the possibility of error in estimating the achievement in arithmetic for a state as a whole on the basis of the returns from a comparatively few cities that furnish the tests upon request. It is not at all clear that the Iowa and Kansas standards are truly state standards or that the Indiana returns for either of the three years are reliable state standards.

The third type of comparison is a comparison of the 1917 achievement of Indiana cities according to population groups with the 1917 Indiana standard (Table III).

The cities and towns giving the arithmetic test in 1916-17 have been divided, as you will notice by the four graphs among these exhibits [not published] into four groups: (1) those cities and towns

TABLE II

A COMPARISON OF THE INDIANA 1917 ACHIEVEMENT WITH INDIANA ACHIEVEMENTS IN THE YEARS 1914 AND 1915

ADDITION—Number of Problems Attempted

Year	GRADE				
	4	5	6	7	8
1914		6.6	7.4	8	9
1915		7.2	8.5	8.9	9.5
1917	4.97	6.53	7.01	7.67	8.6

Number of Problems Correctly Solved

1914		3.6	4.4	5	5.8
1915		4.2	5.3	5.7	6.3
1917	2.60	3.54	4.19	4.85	5.73

SUBTRACTION—Number of Problems Attempted

1914		7.3	8.9	10.1	11.2
1915		7.5	8.7	9.9	10.9
1917	5.61	6.78	7.84	8.86	10.36

Number of Problems Correctly Solved

1914		5	6.5	7.8	8.9
1915		5.3	6.7	7.9	8.9
1917	5.35	4.72	5.84	7.17	8.24

MULTIPLICATION—Number of Problems Attempted

1914		6.3	7.6	8.6	10.2
1915		6	7.5	8.5	9.9
1917	4.12	5.6	6.63	7.87	9.15

Number of Problems Correctly Solved

1914		3.9	5.1	5.9	7.3
1915		3.7	5.1	6	7.3
1917	2.58	3.32	4.46	5.65	6.84

DIVISION—Number of Problems Attempted

1914		4.5	5.7	8.5	10.6
1915		5	6.1	7.8	9.7
1917	2.96	3.96	4.8	6.52	8.42

Number of Problems Correctly Solved

1914		2.6	4.8	6.7	9
1915		3.3	4.8	6.5	8.4
1917	1.07	2.15	3.2	5.19	7

TABLE III

A COMPARISON OF THE 1917 ACHIEVEMENT OF INDIANA CITIES ACCORDING
TO POPULATION GROUPS WITH REFERENCE TO THE
1917 INDIANA STANDARD

(Group I - Population under 1,000)

GRADE	ADDITION		SUBTRACTION		MULTIPLICATION		DIVISION	
	Speed	Rights	Speed	Rights	Speed	Rights	Speed	Rights
4	4.8	2.8	5.6	3.0	4.1	3.1	3.2	1.2
5	6.1	3.4	6.7	4.3	5.7	3.3	4.1	2.1
6	7.0	4.0	8.0	5.8	7.0	4.9	5.2	3.5
7	8.0	4.8	9.5	7.6	8.6	6.4	7.0	5.5
8	8.4	5.5	10.5	8.5	9.3	7.4	8.6	7.3

(Group II (Population from 1,000 to 3,000))

4	4.9	2.6	5.7	3.0	4.6	2.2	3.0	1.0
5	5.7	2.9	6.5	4.1	5.6	3.2	3.7	1.4
6	7.0	3.8	8.0	5.9	6.8	4.4	5.3	3.6
7	8.1	4.5	9.8	7.4	8.6	6.3	7.9	6.4
8	9.0	6.0	11.5	9.2	10.0	7.5	9.4	8.0

(Group III (Population from 3,000 to 10,000))

4	5.4	3.9	5.9	4.6	4.6	3.0	3.2	2.0
5	7.2	4.7	8.0	6.5	6.5	4.7	4.9	3.7
6	8.2	5.6	8.6	6.9	7.9	5.7	6.3	4.9
7	8.2	5.8	9.1	7.6	8.2	5.9	7.4	6.2
8	9.3	6.7	10.6	8.5	9.7	7.5	8.9	7.6

(Group IV (Population over 10,000))

4	4.9	2.4	5.5	3.2	3.7	1.6	2.8	0.7
5	6.2	3.3	6.4	4.4	5.0	2.6	3.5	1.6
6	6.7	4.1	7.3	5.4	6.0	3.8	4.2	2.7
7	7.1	4.6	8.2	6.7	7.0	4.9	5.6	4.2
8	8.3	5.3	9.7	7.5	8.5	5.7	7.3	5.8

Indiana 1917 Medians

4	5.0	2.6	5.6	3.4	4.1	2.6	3.0	1.1
5	6.3	3.5	6.8	4.7	5.6	3.3	4.0	2.2
6	7.0	4.2	7.8	5.8	6.6	4.4	4.8	3.2
7	7.7	4.9	8.9	7.2	7.9	5.7	6.5	5.2
8	8.6	5.7	10.4	8.2	9.2	6.8	8.4	7.0

with a population of less than 1,000, of which group there were sixteen school systems; (2) from 1,000 to 3,000, of which there were six; (3) 3,000 to 10,000 of which there were three; (4) 10,000 and above, of which there were two. In connection with these four groups comparison has been made in regard to each fundamental operation and within each operation both in regard to the number of problems attempted and the number of problems successfully solved.

In Multiplication tests results show that in number of problems attempted, Groups I (less than 1,000) and III (3,000 to 10,000) are above the 1917 state median, and Group II (1,000 to 3,000) is above in every grade except the fifth, whereas Group IV (10,000 or above) is below in all grades. For number of problems correctly solved, Group III (3,000 to 10,000) is above the 1917 Indiana median in all grades; Group I (less than 1,000), in all grades except the fifth, which equals the state median; Group II (1,000 to 3,000) is below in the fourth and fifth, equal to in the sixth, and above in the seventh and eighth; whereas Group IV (10,000 and above) is below in all grades.

In Addition tests results show that in number of problems attempted, in Group III (3,000 to 10,000) the achievement is above the Indiana 1917 median in all grades. Group I (less than 1,000) is below in all grades except the sixth and seventh. Group II (1,000 to 3,000) is above in grades seven and eight, equal to in the sixth, and below in the other two grades; whereas Group IV (10,000 and above) is below in all grades. In number of problems correctly solved, Group III (3,000 to 10,000) is distinctly above the state median in all grades; whereas all other groups are below, except Group II (10,000 and above) in grade eight and Group I in grade four.

In Division tests results show that in number of problems attempted Group I (less than 1,000) is above the Indiana 1917 standard in every grade, and Group III (3,000 to 10,000) in every grade. Group II (1,000 to 3,000) is equal to or above in all grades except the fifth. Group IV (10,000 and above) is below in all grades. In problems correctly solved, Group I (less than 1,000) is above the standard in all grades, except the fifth in which it is below. Group III (3,000 to 10,000) is above thruout. In Group II (1,000 to 3,000) it is above in all grades except the fourth and fifth, in which it is below. Group IV is below in all grades.

In Subtraction tests results show that in number of problems attempted, Group I (1,000 or less) is above the Indiana standard in all grades except the fourth and fifth. Group II (1,000 to 3,000) is above in all grades except the fifth. Group III (3,000 to 10,000) is above in all grades, particularly in grade five. Group IV (10,000 and above) is below in all grades. In problems correctly solved, Group I (1,000 or less) is below in the fourth and fifth grades, equal in the sixth, and above in the seventh and eighth grades. Group II (1,000 to 3,000) is below in the fourth and fifth grades, and above in the sixth, seventh, and eighth. Group III (3,000 to 10,000) makes the best showing and is above from one to two points in the fourth, fifth, and sixth grades. Group IV (10,000 and above) is below in all grades.

It seems that these meager conclusions are a scanty return for the

time and effort of so many agencies and so many individuals and so much time and money. Doubtless a more intensive study and analysis of these results will reveal things much more worth while. Even at the best, however, studies similar to the ones we are making this year and that have been made in the past only scratch the surface of our real problem. By a more intensive coöperation the University and each interested city should begin more definite experimental work. Thus far in our educational measurements we have gone little farther than we were some ten years ago in medical inspection, when we were satisfied with a picture of the results that the competent medical inspection revealed. At present, however, in our campaign for the health of school children, we are satisfying ourselves only when we have added to the work of inspection, first, that of prevention of ill health; and secondly, that of remedying the evils we were unsuccessful in preventing; and thirdly, that of making ourselves more definitely conscious of the methods by which our good results were obtained. By the mere repetition year after year of tests similar to those we are giving this year, we are largely marking time. But we need not be discouraged in the thought that we are necessarily condemned to this marking time process. There is a way out. We have seen it in our improvement of the health conditions of children in public schools. It is just as clearly visible in connection with the achievement in special subjects in school. It is possible, on the basis of this first step, namely that of revealing conditions, to take the three further steps: one looking toward the avoidance of defective instruction, another looking toward the improvement of defective instruction, and a third looking toward a more conscious and general application of methods used in those phases of the work that our tests have revealed as strong.

The hope of the School of Education of Indiana University is that these three forward steps may be made possible as the first step has been made possible—thru a continuation of the past generous coöperation of the school men thruout the state and of men from other states, for in educational advance as well as in advance in all lines, rapidity is insured only thru unselfish coöperative work, and not by selfish and isolated work. We are anxious to accomplish in our educational measurement work the same ultimate results as are being accomplished in the public school health work, namely, to see clearly what we wish to accomplish, and just to what extent we have failed or succeeded in accomplishing it; to recognize the obstacles which stand in the way of the ideal towards which we are striving; and by overcoming those obstacles and by re-enforcing our successful practices to realize our aim to the fullest possible degree.

The Value and Use of a Scale in Handwriting

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THE NECESSITY FOR A STANDARD SCALE

IN teaching handwriting there are two purposes to be kept in mind by both teacher and pupil. The first in importance is economy of time for the reader, which requires *quality*, as determined by legibility. The second is economy of time for the writer, which requires *speed*. The attempt to secure reasonable quality and speed gives rise to the problem of *method* of teaching handwriting. To determine the efficiency of instruction and the ability of the pupils in speed and quality of handwriting, some standard form of *measurement* is necessary.

In determining the merit of the handwriting of any individual pupil, the teacher or supervisor, by observation, can perhaps judge satisfactorily of the quality. But where, for administrative purposes, the handwriting of a group, such as a whole grade or a school, is to be estimated, a fixed set of standards of scaled variation in quality must be used to measure results. The same means is necessary in making a comparative estimate of the handwriting of the different grades of a school, or of the different schools of a city or county, or of the schools of different cities or counties. Such means is necessary, also, in comparing results from the use of different systems and methods of teaching handwriting.

Such uses of a writing scale furnish valuable data to superintendents, supervisors, and teachers for estimating either the absolute or relative efficiency of a system or a method. Weak places are brought to light; and definite problems are suggested. To illustrate: Professor Ashbaugh, of the University of Iowa, using the Ayres Scale for measuring quality, made a study of the handwriting of 28,000 Iowa school children of 110 towns and cities of the state, and of the rural schools of 14 counties. From the data thus secured, Professor Ashbaugh was able to make conclusions of great value to the educational forces of Iowa, and which could not have been made without the use of a scale. He found (1) that the children in the rural schools of the state write as well and as rapidly as the children in town and city schools; (2) that children in towns and small cities write as well and as rapidly as children in the larger cities; (3) that children improve regularly in the quality of writing as they progress thru the grades; (4) that, by comparing the scores with the Freeman standards, Iowa children write as well as, or a shade better than, the average, and that they write much more rapidly than the average, except in the eighth grade, where they are less than one letter per minute slower; (5) that 75 per cent of the eighth grade children meet the requirements in handwriting of the Municipal Civil Service Commission of New York City. From the

data it seems to Professor Ashbaugh that teachers and writing supervisors of Iowa should direct their efforts to bringing up the lower 50 per cent of the children to the Iowa average rather than to attempt to raise the present standard.*

But Professor Ashbaugh's data suggest a further problem, of interest especially to cities having supervisors of writing. This problem may be put in the form of questions. Since the handwriting of Iowa

TABLE I

QUALITY, SPEED, AND GAIN IN HANDWRITING OF THE CHILDREN IN GRADES TWO TO EIGHT OF AN INDIANA CITY (SCHOOL 28)

GRADE	QUALITY	SPEED	GAIN IN QUALITY	GAIN IN SPEED
II.	30	28		
III	30	33	0	5
IV	31	38	1	5
V.....	38	44	7	6
VI	46	63	8	19
VII	53	71	7	8
VIII	65	76	12	5

TABLE II

QUALITY, SPEED, AND GAIN IN HANDWRITING OF THE CHILDREN IN GRADES TWO TO EIGHT OF A SECOND INDIANA CITY (SCHOOL 31)

GRADE	QUALITY	SPEED	GAIN IN QUALITY	GAIN IN SPEED
II	68	22		
III	58	37	-10	15
IV	54	39	-4	2
V.....	55	53	1	14
VI	61	62	6	9
VII	52	73	-9	11
VIII.....	46	101	0	28

children in the small towns and rural schools (where we may suppose that there is little or no special supervision of handwriting) is practically of the same quality and speed as in the larger cities such questions as the following naturally arise: Is special supervision of handwriting advantageous? Is the subject oversupervised in the cities? Is it poorly supervised? Are the systems and methods used in the cities inferior? Do pupils in the cities devote less time and attention to the subject than do pupils of the rural and town schools of the state? Are

* E. J. Ashbaugh. "Handwriting of Iowa School Children." *Extension Division Bulletin* of the University of Iowa, No. 15.

there more unfavorable conditions for learning to write in the larger cities?

For a further illustration of the value of measurement by a scale as giving existing conditions and suggesting pertinent questions to school superintendents, let us examine the data in Tables I and II and Figures 1 and 2. These tables and figures show the handwriting conditions in two Indiana cities.

In working up these data, samples of handwriting from all pupils in both schools in grades two to eight were scored by one person whose percentage of consistency is exceptionally high, being .87 to .99 by the Pearson formula. The Ayres Scale was used.

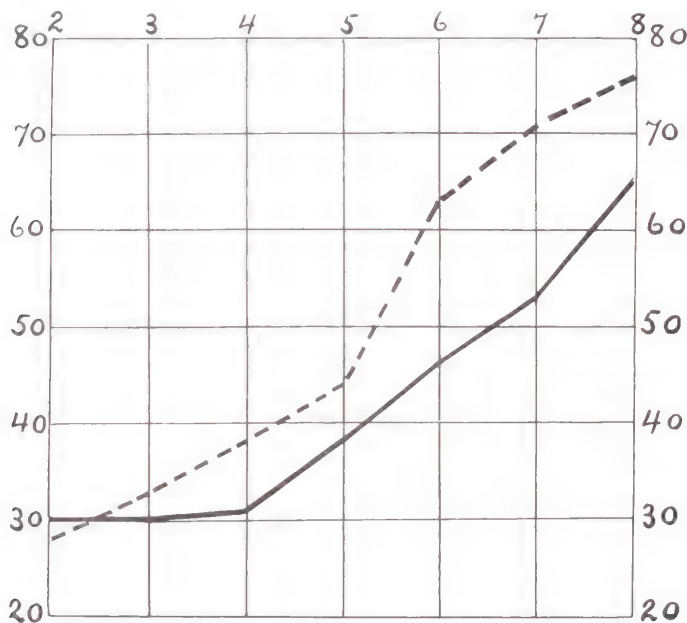


FIGURE 1. GRAPHIC REPRESENTATION OF TABLE I

Observe first the data from School 28. It will be seen that the average quality for the second grade is 30 (see Ayres Scale) and that this quality is held practically unchanged until the end of the fourth year, while the speed increases regularly from 28 to 38 letters per minute. From the fourth grade to the eighth the increase in quality from 31 to 65 is remarkably regular, as shown by the almost straight line in Figure 1. At the same time the increase in speed to 76 letters per minute in the eighth grade is also very regular. The condition is very satisfactory in both quality and speed altho it seems that the speed in grades four to eight might be increased without sacrificing quality. Perhaps the school should give its attention to bringing the lower 50 per cent of the pupils up to the present average of quality and to increasing the speed somewhat in grades four to eight, without

attempting to raise the standard in quality. But if by improvement in method and attention the school can increase the quality and speed of the upper 50 per cent without too great expense of time, so much the better.

Now notice the conditions in School 31 (Table II and Figure 2). (1) The quality is very high (68) in the second grade, but runs steadily down (except for a slight improvement in sixth grade) to 46 in eighth

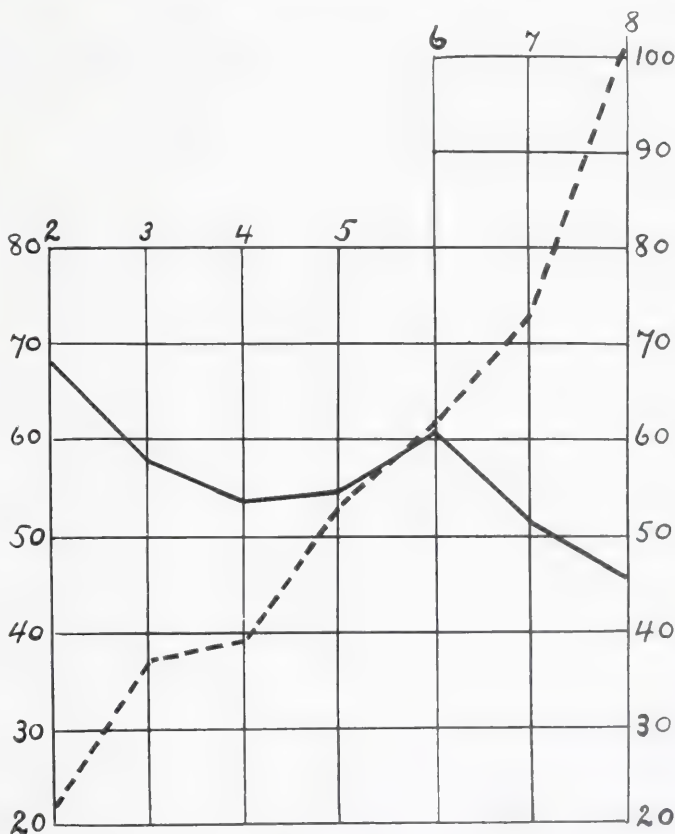


FIGURE 2. GRAPHIC REPRESENTATION OF TABLE II

grade, while the speed starts very low (22 letters per minute) and increases very uniformly and rapidly to 101 letters in the eighth grade. But an average quality of 46 in the eighth grade is far too low, which seems to indicate that quality has been too greatly sacrificed for speed. (2) Since the very high quality reached in second grade is lost in all the grades that follow, the question arises as to whether much of the time required to raise the quality to 68 in second grade is not wasted. Why strive to secure a quality that is not nearly maintained? (3) The low speed in second grade ($2\frac{4}{5}$ seconds to a letter) indicates that the

letters were drawn rather than written. If it should be urged that slow movement is the best mode of learning to produce the proper forms of the letters, there are two answers ready: first, that in School 31 the form suffered after the second year, and second, that with a lower quality and greater speed, School 28 secured a very much more desirable quality in the higher grades, at the same time developing a satisfactory rate. School 31 could undoubtedly improve on its present results by making a comparative study of its own results and those of School 28.

Attention is called to the fact that no reliable study of these schools, either singly or in comparison, could be made without the use of some standardized scale.

THE SCORING OF PAPERS

When writing scales first came into use it was generally thought that measurement of handwriting by the use of a scale was a simple matter, to be done practically as well by one person as by another, and that by its use the scores of one person would be in at least close agreement with those of another. But numerous tests have shown that this is not true.

Individuals without experience in the use of a scale sometimes differ as widely from one another in their scoring with a scale as without. Occasionally the difference has proved greater. The difference is so great that a comparison of scores from different schools made by different persons is unreliable. This unreliability was shown in an attempt to make a study of handwriting in Indiana by using data furnished from 34 Indiana cities and towns. In each city or town all samples were scored either by one person or by a committee of three teachers working together in scoring each sample. The samples from a number of the cities were sent to the writer with the tabulations of the scoring of the committees who did the scoring. These samples were scored again by a paid scorer (D.E.), who had made a study of educational measurement in general, and who had had experience in the use of the Ayres Scale. His consistency tested .87 to .99 (see Table IV and explanation) by the Pearson formula. A comparison of D.E.'s scoring with that of the two committees who scored the papers for Schools 31 and 28 referred to above (two of the 34 schools) will serve to illustrate the lack of agreement in the scoring done in the 34 cities and towns. This comparison is given in Table III.

It will be observed that the committee that scored the papers for School 31 gave a much higher average than that given by D.E., while the committee for School 28 gave a little lower average in each grade except the fourth and the fifth. If the committee for School 28 had scored for School 31, Table III would be very different from what it is.

The scorings of an individual are more likely to be consistent (i.e. in closer agreement) than are those of different individuals. But some individuals show a higher degree of consistency than others, even among experienced scorers. This is illustrated in the following test:

Five persons were chosen for the test. All were teachers of experience and students in education at the time the test was made. All

had made more or less study of educational measurements. All had had experience in the use of the Ayres Scale. Each scored the same thirty numbered samples of handwriting. All samples were from one copy, on uniform paper, and free from distinctive marks, such as blots and crossed-out words or letters. Ten days later the numbers on the samples were changed and the same five persons were asked to score them a second time. After another ten days they scored the samples

TABLE III

LACK OF AGREEMENT IN SCORING BY TWO COMMITTEES FROM TWO CITIES

GRADE	II	III	IV	V	VI	VII	VIII
Average score by committee for School 31	79	73	65	60	66	68	63
Average score given by D.E.	68	58	51	55	61	52	46
Number points of difference	11	15	11	5	5	16	17
Average score by committee for School 28	27	26	33	39	41	46	52
Average score given by D.E.	30	30	31	38	46	53	65
Number points of difference	-3	-4	2	1	-5	-7	13

TABLE IV

DEGREE OF INDIVIDUAL CONSISTENCY OF EACH OF FIVE SCORERS

SCORER	CORRELATION BETWEEN FIRST AND SECOND SCORINGS	CORRELATION BETWEEN SECOND AND THIRD SCORINGS
D.E.	.87	.99
F.A.	.90	.91
C.O.	.74	.87
C.W.	.75	.79
S.W.	.74	.72

a third time. The results of the scorings were tabulated and the correlations between the first and second and between the second and third scorings were determined by the Pearson formula for each scorer. The results are shown in Table IV.

But two individuals may each have a high degree of consistency in his own scoring, and yet not be in close agreement with each other; that is, one may be consistently higher or lower in his scoring than the other. This is illustrated in the scoring of the five persons referred to

in Table IV, and is shown in Table V. Table V is made up from data obtained from the three scorings of the thirty samples referred to above.

To show further the possibilities in lack of agreement among scorers: If S.W. (of Table V), whose scoring is lower than that of D.E., had scored the samples for School 31, instead of D.E., the difference in points of quality shown by Table III would have been still greater. S.W.'s average scores and the difference in points would have been about as indicated in Table VI.

The question suggested by the foregoing part of this section is how to secure most reliable scoring. The data seem to justify the fol-

TABLE V

LACK OF AGREEMENT IN THE SCORING OF FIVE PERSONS, EACH HAVING A GOOD DEGREE OF CONSISTENCY IN HIS OWN SCORING, AND EACH A SCORER OF EXPERIENCE

Scorers	Average of 90 Markings	Standard Deviation
D.E.	56.0	11
C.O.	53.0	13
L.A.	48.5	11
C.W.	45.5	12
S.W.	44.0	9

TABLE VI

SHOWING INDIVIDUAL DIFFERENCES IN SCORING

Grade	II	III	IV	V	VI	VII	VIII
Average score by committee for School 31	79	73	65	60	66	68	63
Approximate average S.W. would have given	53	46	42	43	48	41	36
Number of points of difference	26	27	23	17	18	27	27

lowing answer: (1) Where possible the samples to be compared should be scored by one person who tests high in consistency. He should also be tested to determine whether his scoring is high, medium, or low. Tests should be repeated once or twice a year until the scorer's habits are formed and well fixed. The same person should score for the same system of schools year after year. (2) Where the system is too large for one person to score all papers, two or more persons equally consistent in their scoring may do the scoring for the system. If some regularly give higher or lower scores than others their scores can be lowered or raised proportionately. The same plan can be used in comparing the handwriting in the schools of different cities, towns, or coun-

ties. But the more persons engaged in scoring the less reliable are the scores.

The following suggestions in regard to scorers should be observed:

(1) A person who scores any considerable number of papers should do the scoring as a part of his regular school duties, not as extra work. (2) He should have regular hours for scoring, and should go to his work in good physical condition—free from fatigue or illness. (3) He should have a liking for the work, so that he will take a specialist's interest in it. (4) He should make a study of educational measurements in general, and a special study of the measurement of handwriting.

Because of the chances for irregularities in scoring and in making comparative studies of schools, and for the purpose of determining standards in quality, speed, and method, it is necessary to have the aid of a central bureau as a sort of "clearing-house," where educational measurements are studied and tested by specialists, and where experimental work and tests of various kinds are constantly being conducted. To meet such necessity the School of Education of Indiana University maintains a Bureau of Coöperative Research. The bureau will gladly aid in any local study of handwriting, in testing scorers, and in making comparative studies of the handwriting and methods of different schools.

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A Study in Reading (Gray Oral and Silent Reading Tests) in Indiana Cities

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THE report that I am to present must necessarily be brief. In the few minutes that I have I shall make a statement of the time and conditions under which this study was made. You already know that we used the Gray tests. I shall give you a statement in numbers of the immediate results from the entire state, and also by the groups of cities which we have arranged; we shall speak of the number of cities concerned and make a comparison of these three groups of cities arranged according to population.

The time will scarcely permit a detailed analysis of results from individual cities or an adequate discussion of the significance of these definite records for the study of the problems of reading. After I have finished, Professor Judd can give you this diagnosis of the individual results, and Mr. Gray is present to answer any questions you may have as to the method of giving and scoring results.

You have in your hands copies of the material used in the oral tests, that is, the twelve standardized paragraphs arranged in definite order; you have copies of the material used in the silent tests: the record sheet, the sheet of instructions, and then the individual sheets which the pupils use for their reproduction. You can glance hastily over the method, and from time to time I shall try to make clear some of the instructions recorded here. When the study was planned and we had returns from the cities, more than fifty indicated their desire to coöperate in giving the Gray tests. Later when we asked them to confirm their orders before sending out the material that number was reduced to thirty-five, and now for this preliminary report, which is only preliminary, I can report the result from but seventeen cities. We waited just as long as we could, but there are only seventeen cities which could be included at this time.

Originally the idea was to test the entire number of children in the various classes, but the length of time required to give the individual tests led us to decide to permit a minimum number of ten pupils in a class, altho the superintendent could test as many as he chose to test. Thus the number varies in the different cities; one or two cities tested their entire number of pupils in the several classes. Others tested, as I said, the minimum number of ten.

The study was made approximately in February; some cities gave it a few days in February and some a few days at the beginning of March, but approximately it was given during the month of February. The cities were divided into groups according to population so that we

might make a comparison of village and small town schools with the larger cities. Group 1 includes those cities which have a population of from 200 to 2,000; Group 2 from 2,000 to 10,000, and Group 3, 10,000 and above.

Because of the small number that sent in returns, the number of cities in the various groups is not adequate to make definite statements as to results, but we can at least indicate the general tendency. In the second grade the total number of children concerned was 500; in the third, 913; in the fourth, 990; in the fifth, 974; in the sixth, 881; in the seventh, 269; and in the eighth, 253.

The total number of children concerned, then, is about 4,800. Before continuing my discussion I should like to say to the superintendents who have coöperated that I think they will be interested in obtaining the monograph recently published ("Studies of Elementary School Reading Through Standardized Tests"), containing Mr. Gray's own studies of elementary school reading thru standardized tests, in which he discusses the derivation of the tests, their validity, their use, and problems which we legitimately study; records the results from Cleveland in detail, and then makes a comparison with cities included in other studies, such as St. Louis and Grand Rapids. The publication can be obtained from the University of Chicago Press.

Seven cities are included in Group 1; five cities in Group 2; and only three cities, and two or three classes from the Fort Wayne Normal School in Group 3. In deciding to use the Gray test we realized the fact stated by Mr. Gray, that achievement in both oral and silent reading must be the basis of determining quality of instruction in reading. Most of the cities decided to give both oral and silent tests.

We asked if possible that the principal or the superintendent give the test, and in most cases that was done. In one or two cities where the teachers themselves gave them, they worked under specific and careful directions from the principals. You notice there you have the specific directions for giving the tests, the method of scoring; you notice the type of error that is to be recorded, and the fact that the number of errors is to be summarized at the end of each paragraph.

Pupils, according to instructions, were permitted to read; if they were in a class below the fifth grade they began with Paragraph 1, if in the fifth grade or above, they began with Paragraph 4. In either case they continued to read until they had made a total of seven errors or more in each of two paragraphs.

A system of scoring was used, based on a combination of the time and the errors, which permits a representation of the score numerically. You notice that Mr. Gray has indicated on the score sheet the method of scoring. The quality, as far as expression and emotional appreciation are concerned, is not recorded specifically; that is, of course, very difficult to estimate; but experimentation has shown that there is a high degree of correlation between expression and oral ability as represented by the Gray score.

The scores for the sixteen cities are best presented by the tables that accompany this discussion. You will have no difficulty in examining the individual scores of the fifteen cities presented in Table I and

TABLE I
AVERAGE SCORES IN ORAL READING IN EACH GRADE ABOVE THE FIRST IN FIFTEN INDIANA CITIES

CITIES	GRADE 2		GRADE 3		GRADE 4		GRADE 5		GRADE 6		GRADE 7		GRADE 8	
	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score
<i>Group 1 (200-2,000)</i>														
1	10	39	10	41	19	44	19	45	19	47	19	38		
2			10	37	21	39	17	46	15	39	22	39	43	41
3	20	43	22	43	14	42	25	45	29	46	22	45	19	43
4	10	46							10	47				
5	19	21	22	42	17	59	22	43	18	46	29	47	17	34
6	11	32	17	38	17	38	21	43	18	55	19	40	16	44
7					10	42	17	40			6	36	10	37
<i>Group 2 (2,000-10,000)</i>														
8	10	37	19	45	19	44	16	48	10	51	19	50	10	54
9	20	41	29	49	29	46	29	59	20	54	29	51	8	48
10	36	37	36	34	24	41	24	43	24	41	12	40	12	36
11			45	45	39	48	51	47	79	42	76	44	60	42
12														
<i>Group 3 (10,000-50,000)</i>														
13			28	39	31.5	46	32.4	47	23.5	46				
14	30	39	40	47	30	47	30	48	30	49	20	55	20	49
15														
16	32.5	27	149	37	34.2	41	125	43	22	40	40	47		
Total	494		689		858		718		279	40	240		215	
Average				40.5		43.4		44.5						42.8
Grav. Standard		43		46		47		48		49		47		48

TABLE II
AVERAGE SCORES IN ORAL READING IN EACH GRADE ABOVE THE FIRST FOR GROUPS 1, 2, AND 3

GROUPS	GRADE 2		GRADE 3		GRADE 4		GRADE 5		GRADE 6		GRADE 7		GRADE 8	
	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score
Group 1	73	32.4	81	38.2	89	42.0	112	42.8	120	46.7	102	40.8	105	39.8
Group 2	46	38.3	111	43.3	84	44.8	105	47.0	133	47.0	118	46.3	90	45.0
Group 3	355	33.0	477	41.0	685	44.5	501	44.5	567	45.5	20	55.0	20	49.0
Total	494		669		858		718		815		241		215	
Average		34.0		40.5		43.4		44.5		46.0		44.0		42.8
Gray Standard		43		45		47		48.0		49.0		47.0		48.0

in seeing how the various groups presented in Table II compare with each other, with the state median, and also in each case with Mr. Gray's standard, which he derived from testing 2,654 pupils in three or four states. In these two tables everything is definitely indicated, the number of children in each city, grade, or group, and the score made by each.

The average oral reading scores for Indiana are compared with the average scores which were secured in a number of other investigations in Table III. The investigations have been listed in the order in which they were given during the school year. On the whole, Indiana does not compare unfavorably with the results from Northern Illinois. It parallels; it very closely reaches it in grade three, and there almost touches again in grade six, and then drops a trifle below it in the seventh and eighth. On the other hand, Grand Rapids, where the tests were given at about the same time in the school year as in Indiana, secured distinctly superior results. Of course, we are below the Gray standard, varying from 3 to 9 points all the way along. St. Louis stands very

TABLE III
AVERAGE ORAL READING SCORES

CITIES	DATE	GRADE							
		2	3	4	5	6	7	8	
Illinois School	September, 1914	29	28	39	43	45	46		
Northern Illinois	November, 1916	28	42	41	47	47	46	45	
Indiana	February, 1917	31	40 5	43 4	44 5	46	44	42 8	
Grand Rapids	March, 1914	44	45	49	50	47	48	48	
Cleveland	June, 1915	42	46	47	48	49	47	48	
St. Louis	January, 1916	45	50	52	51	51	51	51	

much above the standard, and she does that straight thru in both the oral and silent tests, a condition that shows the effectiveness of the instruction in St. Louis.

You will be interested in making comparisons with St. Louis and Cleveland. St. Louis excels straight thru the reading tests; in quality she is much superior to Cleveland, while Cleveland excels in the rate, but Cleveland shows a great many more inaccuracies in every grade but one, showing that perhaps speed has been emphasized at the expense of accuracy. St. Louis, it may be, could bring up her record in speed, but of course that is yet to be determined. On the whole, we may say that the records apparently indicate at least that the instruction in St. Louis is quite effective at the present time.

Cleveland shows up better in the lower grades than in the upper ones, showing, of course, the thing which I have just said: that perhaps speed in the lower grades has been emphasized and verbal facility has been developed at the expense of comprehension, mastery of result, which brings up the whole problem of rate versus comprehension.

I would like for a moment to speak of the relative scores for Indi-

ana as a whole, the cities as a whole, and these different groups. You see in the first group there are the rural and town schools; in the second group cities up to 10,000 population, in the third group cities of 10,000 and above. On the whole, the best record made in oral reading is that of the second group. The Gray Standard in the second grade is 43. The average for Indiana is 34, while this second group shows up with an average of 38; you see, 5 points below the standard. This is a bit better than Northern Illinois, which has but 28 for the second grade.

In the third grade where the standard is 46, Indiana's average is 40; our best group has an average of 43. In the fourth grade the standard is 47, Indiana's average 43; and that of the best group 44.8. The fifth grade standard is 48; our average is 44; Group 2 shows up with an average of 47, practically standard. In the sixth grade the standard is 49, Indiana has 46, and this group 47. The seventh grade standard is 47, Indiana 44, and this particular group 46. In the eighth grade Indiana drops down to 42 as compared with the standard of 48, whereas the best group has a record of 45. You see on the whole Group 2 is best from the second to the sixth grade, Group 3 is superior in the seventh and eighth, while the first group is poorest straight thru; that is, in oral reading.

The best cities, on the whole, in oral reading are Cities 14 and 9. As a close second City 8 has high records in fifth, sixth, seventh, and eighth grades, but they are a little inconsistent; their progress is irregular in the lower grades.

It is impossible for me to speak of all these. I should like to speak, for example, of City 5 in the second grade; they drop down to 21, while in their fifth grade, for example, they go up to 50. Fifty there, you see, is 2 points above the average. There is evidently some corrective work needed in that second grade. City 8 is, perhaps, the median and ranks next to Cities 9 and 14.

I shall have to pass on rather quickly to silent reading. You have there in your hands the cards showing the selections, Tiny Tad, the Grasshoppers, and Ancient Ships. In addition to that you have these reproduction sheets for the pupils and you have your instruction sheet showing the nature of the tests and the method of scoring. The standard for the silent reading tests was derived from these same thirteen cities which I have mentioned, with a total of 2,654 pupils.

The scores in the rate of silent reading are shown in Table IV and the cities are definitely indicated in the same fashion as in Table I.

The Gray standard in the rate of silent reading for the second grade is 1.5; that is, 1.5 words per second. Indiana comes up to the standard with a record of 1.5. In the third grade the standard is 2.3, and we have a score of 2.1 which is slightly low, but the best city, or best group, Group 2, has a record of 2.3 and so on thru. We come a bit closer to the standard in the rate of silent reading than we did in oral reading. There is a difference of only from one to two-tenths words per second in all grades. Our record is superior to that of the cities of Northern Illinois in this case, but we do not attain the standard reached by St. Louis except in the seventh grade, and there St. Louis, the In-

TABLE V
AVERAGE RATES IN SILENT READING IN EACH GRADE ABOVE THE FIRST FOR GROUPS 1, 2, AND 3

Groups	GRADE 2		GRADE 3		GRADE 4		GRADE 5		GRADE 6		GRADE 7		GRADE 8	
	Num- ber of Pupils	Rate	Num- ber of Pupils	Rate	Num- ber of Pupils	Rate	Num- ber of Pupils	Rate	Num- ber of Pupils	Rate	Num- ber of Pupils	Rate	Num- ber of Pupils	Rate
Group 1	59	1.39	82	1.90	95	1.79	111	2.16	122	2.73	100	2.64	105	2.41
Group 2	66	1.79	241	2.33	184	1.99	201	2.34	165	2.53	149	2.76	128	2.76
Group 3	375	1.26	620	2.18	711	2.14	662	2.84	504	2.76	20	3.05	20	3.20
Total	500		913		990		974		881		269		253	
Average	1.50		2.07		1.98		2.44		2.67		2.81		2.79	
Grav. Standard	1.50		2.30		2.20		2.57		2.79		2.69		2.87	

TABLE VI
AVERAGE QUALITY SCORES IN SILENT READING IN EACH GRADE ABOVE THE FIRST FOR FIFTEEN INDIANA CITIES

Cities	Grade 2		Grade 3		Grade 4		Grade 5		Grade 6		Grade 7		Grade 8	
	Num- ber of Pupils	Score per Pupil	Num- ber of Pupils	Score per Pupil	Num- ber of Pupils	Score per Pupil	Num- ber of Pupils	Score per Pupil	Num- ber of Pupils	Score per Pupil	Num- ber of Pupils	Score per Pupil	Num- ber of Pupils	Score per Pupil
<i>Group 1, 1000-1400</i>														
1	40	51	40	44	40	45	40	28	40	25	40	14		
2			13	36	24	16	17	27	37	27	21	19	46	26
3			22	38	14	24	25	34	26	42	22	21	19	37
4	40	40							40	34				
5	25	21	24	28	23	21	22	30	18	24	20	17	17	22
6	44	46	17	41	17	12	21	25	18	29	10	16	16	34
7					10	20	16	27			8	15	10	19
<i>Group 2, 1400-1600</i>														
8	40	35	10	42	10	32	16	35	10	41	10	25	10	27
9														
10	36	27	36	29	24	24	24	24	24	20	12	16	12	12
11			115	35	160	24	117	24	81	27	77	20	56	27
12	20	23	50	31	50	17	50	29	50	33	50	23	50	30
<i>Group 3, 1600-2000</i>														
13			287	32	300	19	316	27	238	39				
14	30	25	40	31	30	26	30	31	34	32	50	20	20	20
15									16	33				
16	345	25	293	33	381	20	294	24	310	32				
Total	500		943		999		674		881		266		235	
Average		39.5		33.1		29.5		27		31.1		18.7		23.4
Gray Standard		32		37		29		32		39		22		27

TABLE VII
AVERAGE QUALITY SCORES IN SILENT READING IN EACH GRADE ABOVE THE FIRST FOR GROUPS 1, 2, AND 3

CITIES	GRADE 2		GRADE 3		GRADE 4		GRADE 5		GRADE 6		GRADE 7		GRADE 8	
	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score	Num- ber of Pupils	Score
Group 1	59	39.5	82	34.8	95	17.6	111	28.5	122	29.8	100	17.0	105	23.6
Group 2	66	28.3	211	31.7	184	24.0	201	28.0	165	32.5	149	21.0	128	24.0
Group 3	375	25.0	620	32.0	711	21.6	662	26.5	594	31.7	20	20.0	20	20.0
Total	500		913		990		974		881		269		253	
Average		32.5		33.1		20.5		27.8		31.1		18.7		23.4
Gray Standard		32		37		29		32		39		22		27

diana, and Northern Illinois cities are all above the standard; that is, in the seventh grade.

Table V shows the comparative standing of the several groups again. You will notice that Group 1 is lowest; Group 2 has better scores. Group 3, in this case, has the best record, altho in certain instances Group 2 surpasses it.

Again we find that the same statements could be made about St. Louis's rate and quality of silent reading as oral reading; again she is superior to Cleveland, but the Indiana standard here is superior to that of Northern Illinois.

The best records and the poorest records here again show the same wide range that appeared in the oral studies. There were two overlapping, particularly in fourth, fifth, and sixth grades, and very often there is a difference between seventh and eighth grades, or, in fact, the seventh grade may be superior to the eighth grade; this is especially true in small schools. That is rather interesting when in the past we have insisted that the small schools, country and small town schools, emphasize reading as one of the three arts.

When it comes to quality (Tables VI and VII) we do not have the same statement. We find that Group 1 is superior in the second, third, and in the fifth grade; it drops down in the other grades, and Group 2, then, is superior in the upper grades.

You notice the difference, the unevenness of the results. Group 1 has an average, for example, of 39.5 in the second grade, 7.5 points above the standard; in the third it is 2 points below standard; and in the fourth and on, it is from 3 to 11 points below standard. That, of course, is decidedly interesting. It does not show continuous progress at all, but rather decidedly irregular progress.

Here is an interesting fact in Group 2. The third grade is above the standard in speed; you have 2.33 as compared with 2.30 and yet it drops down to 32 in quality as compared with the standard of 37. A record like that indicates definitely where the emphasis needs to be placed. To be sure, a definite statement is premature and unwarranted, and yet on the face of it you might say there that you need definite emphasis on quality. On the whole, in this group in quality, taking all the averages into consideration, the third and sixth grades seem farthest below standard in quality, with averages of only 31.7 and 32.5 when they should have 37 and 39 respectively. The second and fourth are next poorest, while the seventh and eighth are nearest standard. Examination of these individual tables will show in what respects the individual cities are weakest and strongest; it shows also whether there has been overlapping, or whether there has been continuous progress, whether there is acceleration in one grade and retardation in another. All of that can be clearly determined.

Now, let me summarize briefly the best cities and poorest. City 14 probably ranks highest in all respects. In quality City 11, for example, is very high in third, seventh, and eighth; it drops very decidedly in grades four, five, and six. You see, that indicates a definite situation which could be handled. City 5, one of the poorest cities in oral reading achievement, is very low in second and eighth grade, and yet the third

is not so bad, and in grade four they jump way up to 50, far above the average, and I fancy they will have to explain that to us. In the sixth and seventh also they have a splendid record. City 8 has a very high rate in the second grade in silent reading, and inferior quality in the next grade. You have exactly the opposite result. A further study of these records will permit an explanation of some of these questions which we cannot at the present moment determine. Of course, the inequalities may be due to differences in emphasis in giving the tests. In some of these schools conditions are very different for giving tests, and again the differences may be due to actual objective conditions within the schools.

Suggestions Pertaining to the Training of Feeble-Minded Boys in the Public Schools

CALVIN P. STONE, Psychologist, Indiana Reformatory

PRISON walls have not, in themselves, the power of implanting in delinquent youth the capacity for reformation. This capacity, like the capacity to be normal, is a heritage from nature, to which little may be added and from which little may be taken away. And those individuals who are so constituted that they can undergo permanent reformation in a correctional institution possess the qualities and powers of men who do not violate the laws of person, property, and public order. But those who are not so constituted, despite all efforts at reformation, are destined to continue a life of criminal activity unless deprived of their freedom.

This view of the reformatory situation, altho enshrouded with murky darkness, is now quite generally accepted by men of keenest discernment who are engaged in the administration of justice from the bench, as well as those employed in correctional institutions; and, in their opinion, the duty of society, in respect to the present and future perpetrators of crime, is twofold: (1) permanent segregation or incarceration of habitual criminals and those who, because of physical, intellectual, or moral defects, have repeatedly shown their incapacity for functioning normally in society; and (2) the discovery at an early age, for the purpose of discipline and industrial training, all high grade defectives and so-called normal boys in whom normality is usually more apparent than real, who cannot be induced to follow the regular routine of school work as it now exists.

Obviously, the first phase of this problem is one to be solved by the alienists, the courts of justice, and the penal institutions; but the second is one in which the public school must play a prominent rôle, for to it is entrusted the work of fitting youth for a life of usefulness and service. And since the defective mind, undisciplined and void of industrial training, is the fertile soil from which a harvest of delinquents is reaped each year, it is imperative that superintendents and principals of school systems over the state of Indiana concert their efforts in initiating and perpetuating a reform movement for the training of defectives which will make useful, or at least self-supporting, citizens of a great number of our young men who otherwise would land in correctional institutions.

To further the work of making this reform movement general thruout the state, the research laboratory of the Indiana Reformatory desires to offer its service. The institution will gladly coöperate with city superintendents or departments of education in universities and normal schools of the state by placing in their hands, in so far as

it is practicable, results of research work. During the past four years this laboratory has developed a technique of procedure by means of which valuable data concerning delinquent men are being gathered. These data are not only of practical value in handling men within the institution, but are also of value to the Board of State Charities and other organizations interested in the problems of mental hygiene, pauperism, and crime. No doubt, psychographs from our files will be of value to superintendents desiring to familiarize themselves with typical cases of delinquency.

As certain charts now on exhibition are intended to show, the intelligence level of our reformatory is much lower than most people are willing to believe. Standardized tests show that the average mental age based on results of some two thousand cases is less than twelve years—that is to say, nearly forty per cent of the men committed to the Indiana Reformatory are so defective in general intelligence that they fall within the moron and border-line groups.

Of the entire inmate body, there is a group of men, relatively small in number—probably less than fifteen per cent—who not only have had excellent environmental advantages, but also have manifested from the earliest age the capacity for developing into capable, honorable, and law-abiding citizens; but who, because of some peculiar twist of circumstances or from defects of mind or body so subtle and recondite as to be indiscernible to the closest scrutiny of the alienist, have failed to meet their obligations to society. And there is a second group, large in number, consisting of individuals born short of the potential qualities which make for normality; men in whom, because of this shortage at birth, there is lacking that impulse from within which initiates in its season the natural unfolding of instincts in such relation as to give poise and balance to their reactions to the spiritual and physical forces of their environment which are intended to fit them for useful lives in society.

To this group I especially desire to call attention in this short paper, for it constitutes the greatest problem of the correctional institution.

A clinical examination of the men of this group lays bare grave deficiencies in mental and physical development and warrants the conclusion, oftentimes stated heretofore by psychologists, criminologists, and alienists, that they are intellectual, emotional, and volitional dwarfs, predestined by nature to bear thruout life the stigma of degeneracy. The entire life of some of these men is a continuous revelation of the lack of practical judgment, common sense, and ability to avoid errors and surmount the difficulties of daily life. In the realm of emotion, dwarfism is revealed by the lack of altruism and regard for the rights and privileges of others. Defects in the volitional sphere are manifested by the inability to control impulses; not alone to restrain impulses prompting actions inimical to self and others, but also to guide and direct impulses toward the performance of acts of positive value. Thus, in this group are found men who are ignorant and cannot learn what is right, men who have no desire to do what society says is right, and lastly men who are unable to execute that which they not only know is right but ardently wish to accomplish.

The following psychograph is typical of one devoid of intelligence:

and, if time permitted, cases typical of deficiency in the realm of emotion and volition could be cited.

The boy in question is of German parentage, and at the time he entered the institution was only sixteen years of age. One morning in September while going to work, with a dinner pail on his arm, he was stopped by two boys, who asked him to join them in a tramp over the country. They offered to finance the excursion and quickly overruled his first objections to leaving his job. They started at once and after riding several miles on a freight train were kicked off by a brakeman, near Plymouth, Ind. In order to add to their meager supply of money, they worked a day or two for a farmer, picking pickles, and then resumed their tramp, this time "hitting the ties". After walking a few miles they came upon a handcar standing beside the track. One boy suggested that they set it on the rails and drive it to the nearest town. The others agreed, and in a short time they were off. Presently they approached a signal tower, where a detective who saw them coming put himself in a position to stop them. Anticipating his action, they slowed down the car and got off. As the officer approached, the older and brighter boys ran into a cornfield, but the subject did not have even sufficient initiative to follow. He was arrested and taken to court. The judge, not knowing what else to do with him, sentenced him to the Indiana Reformatory.

This boy attended a Lutheran parochial school between the ages of six and fourteen, spending two years in each grade and receiving promotions without actually doing the work. He can neither read nor write; and, what is more, without a great deal of personal attention he will never be able to do so.

He has almost no stock of information. He does not know the name of our President, the largest city in the United States, the largest city in Indiana, or Ohio, or what state is east or west of Indiana. He has no knowledge of such men as James Whitcomb Riley, Abraham Lincoln, or George Washington, and has never heard of Panama, the Kaiser, or Arizona. He can with a little help count from one to one hundred, and recognizes numbers up to forty. He can write his own name and is able to spell his surname orally but not his Christian name. He cannot write the name of any member of his family.

According to the Binet scale, his mental age is eight years. He passed all tests for seven-year-olds and sufficient other tests to give him an additional year. His auditory memory is about equal to that of a normal seven-year-old boy. He repeated six digits but failed on seven and was unable to repeat a sentence of twenty-two syllables. He cannot name the days of the week, does not know the present day of the month, and does not even know the month in which he left home. In three minutes he was able to give only thirty words, altho a normal ten-year-old child can give sixty or more. He was unable to make a sentence in which the words "Louisville, river, money" were used. He did not detect gross absurdities in statements given him, and failed to comprehend easy problems pertaining to conduct. When asked to draw a diamond that was placed before him he succeeded only when the point was toward him, and failed in seven attempts when the large angle was

toward him. He recognizes pieces of money, but is unable to combine them to get a sum. In evaluating several coins amounting to forty-eight cents in all, the coins being a quarter, four nickels, and three pennies, he failed utterly. Having given him twenty-four cents, four nickels and four pennies, as his change, I submitted the following problem: "I am going to buy from you five cents' worth of candy, a nickel's worth of peanuts, and a nickel's worth of rolls. I will give you a quarter. From your change box return the change that I should receive." His answer to the problem was: "You don't get no change." A second problem was given him in which I bought a dime's worth of goods and gave him a quarter. He returned ten cents as my change.

Form board tests revealed poor perception of size and volume, and likewise poor motor coordination. He was unable in the three trials given him to work out a definite plan of procedure by means of which he could reduce the time and errors. On the Healy instruction box he followed the first four steps toward opening the box, but failed on all succeeding steps. After the second and third demonstrations he merely repeated his procedure after the first demonstration; no improvement whatever was noticed. Subsequently, the fourth demonstration was given, after which he did successfully five steps but failed to do the remaining two steps which would have brought success in opening the box.

This subject is a low grade moron, and because of his lack of intelligence was unable to do any of the work given him in the school which he was by law compelled to attend. His case is typical of a great number of boys now confined in our institution. Notwithstanding grave deficiencies of mind, when they were of school age our public schools treated them as normal children and attempted to make them master a regime of mental activity which they were incapable of mastering and which their after-life has seldom given them an opportunity to use. Teachers, inspired with the ideal of maintaining the class as a unit rather than considering them as individuals, formed a habit of nagging and scolding, which created in the minds of the dullards a dislike for school work, and caused them to associate everything that is bad with the teacher and her school. The result of this is truancy and incorrigibility on the pupil's part. It is a notable fact that truancy and incorrigibility usually begin when the defective is approaching the limits of his capacity to do school work. Idleness resulting from truancy is oftentimes followed by petty thievery and misdemeanors. These misdemeanors serve as a hardening or seasoning process, which, in connection with recklessness at puberty and during the period of adolescence, starts these young boys out on a criminal career that may not be checked even inside the walls of a reformatory. It is clear to see that the schools must make more adequate provisions to meet the needs of the subnormal children. Since they must of necessity be the hewers of wood and drawers of water in our industrial system, it must give them an opportunity to learn a trade or engage in a form of labor suited to their physical strength and mentality which will serve the double purpose of forming habits of industry and of preparing them for making their living after they have left school. Let the school require them

to work with their hands, all day if necessary, giving them when occasion arises the opportunity to learn to read and write.

The hope of the reformatory lies in the belief that there is in every man the capacity for developing what Professor Veblen calls "a sense of the merit of serviceability or efficiency and of the demerit of futility, waste, or incapacity".

This is virtually an ideal of workmanship by virtue of which one does his share of the world's work in the best manner that it can be done regardless of the selfish interests prompting him to leave it undone. This ideal is a perpetual motive which goads the individual on thru those periods of depression and dissatisfaction which come to everyone, in which he has a desire to throw up his job. The rudiments of this ideal are founded in the instinctive love for praise and avoidance of dispraise of others, and are possessed by every boy. The normal boy has an opportunity to develop this ideal in his daily school work because that work is so adjusted as to difficulty that he can master it and view the finished product with satisfaction; but not so in the case of the feeble-minded boy. He is not able to master the work; hence he never feels that glow of pride which comes from putting his efficiency in evidence, and he loses the praise from others which is given in recognition of meritorious work. As a result, these basic instincts, which, when properly directed, develop into an ideal of workmanship, become perverted. This is what has occurred in a great number of men in our institution. Those who engage in the various forms of skilled and manual labor are not motivated by a strong desire to acquire proficiency in their line, to satisfy their employer, or to render a real service. Instead, their chief source of emulation is habits of "conspicuous waste" or "conspicuous consumption" of their earnings. Lavishness in dress, prodigality in wasting their money on worthless associates, and a total disregard for the future become to them a source of esteem. Obviously, such habits are antithetic to the ideal of workmanship, and in time cause it to sink into the background so that it is no longer a motive prompting the individual to do his work well. As a result he loses his position; but notwithstanding loss of position and loss of income, his habits of living do not change and his desire to continue a life of "conspicuous waste" and "conspicuous consumption" of money soon exhaust his savings and drive him toward a life of crime, in which he resorts to predatory methods of seizure and pillage.

Most of these boys can never be self-supporting in the sense that normal boys are self-supporting. The feeble-minded must always be considered dependent; yet, if they are taught to work diligently and persistently at a kind of labor suited to their strength of body and mentality, friends or relatives need do little more than furnish them a protected environment, a thing which can be done in the majority of cases without great cost to anyone. Everyone knows of feeble-minded boys or girls in his community who are doing this very thing, and are passed almost unnoticed by those about them. In a great number of farm districts boys and girls of this type are to be found. From early childhood they have been led to form habits of industry. They know

nothing but work; they have learned to enjoy it, and as skill has come thru long training they look with pride upon their achievements.

In closing I should say by way of summary that the imperative duty of the public schools relative to the feeble-minded boys is, first, to discover them at the earliest age possible; secondly, to give them a kind of work that is suited to their mental capacity in the hope that, thru continuous application, in each individual there will be developed an ideal of workmanship that will make him see that efficiency and serviceability alone are meritorious and that inefficiency and waste are futile; and, lastly, to give whatever assistance it can in placing these children in a protected environment which will be as free as possible from degrading influences tending to bring them into conflict with the law.

Experimental Work in Indiana Schools

WILLIAM F. BOOK, Professor of Educational Psychology in Indiana University

THE purpose of this conference, as it has been expressed and talked over from time to time by those of us who have been connected with the work from the start, has been to hear reports of the studies made by the school people of the state in coöperation with the Bureau here at the University, and to bring to the conference each year one or more men actively engaged in the scientific study of the problems undertaken by the Bureau and the school people of the state during the year, men who could give us new ideas in regard to method and helpful suggestions in regard to the studies which we were trying to make, and who would inspire us to greater endeavor in the study of the educational problems we had undertaken to solve. It has, in the third place, been the purpose to make the conference a sort of clearing-house for all scientific work done on educational problems by the school men of the state during the year. We have felt that a part of the time at each conference should be devoted to a discussion of results and methods employed in all types of educational research carried on in the state during the year.

The purpose of the University in establishing and maintaining this conference and a Bureau for Coöperative Study of Educational Problems has been at various times expressed in some such ways as these: We wanted to try to make a contribution to our knowledge of educational science by helping the school men of the state make some of the studies needed to put our work on a more efficient and economical basis. We hoped also to stimulate by this means the scientific study of educational problems thruout the state.

There is a difference between having an experiment made in the University laboratory by so-called scientific experts, who know little or nothing about the conditions under which the teacher and superintendent work, and making a coöperative study such as we are trying to make by having the men and women engaged in actual school work do all they can in coöperation with a group of men and women who are making a special study of the methods involved. It is believed that if some of our many difficult problems were worked at coöperatively and if those actively engaged in the practical phases of school work could take a more prominent part in making these studies, better trained educational workers would be produced for the state. Furthermore, our methods and results would be constantly checked up by those in a position to judge of their practical value. It has also been the purpose to render actual aid to the school people of the state in making these studies by doing at the University the things which could not be done by the different school officers, or the cities that wanted to make such studies.

Some or all of these results have been achieved to an encouraging

degree. Four years ago little or no scientific work was attempted by the school men of the state. This year thirty-five cities have coöperated in the studies made by the Bureau, many more than ever before. More lines of work have been undertaken than during any previous year, and I think much better work has been done than at any time previously.

One thing that has occurred to me during the last two or three conferences is the need of more criticism of our methods, procedure, and results. We need to criticize them more closely than we have done. Otherwise, we will make ourselves believe that we have something when we haven't anything which works. Much has been done in the state this year independently of the Bureau of Coöperative Research. Many cities, teachers, and superintendents have been studying some of their own problems this year by methods discussed and worked out here in previous conferences. Many of our superintendents and principals and teachers have also gotten in the habit of going to the University here, or to Chicago, or Columbia, or Wisconsin, for a summer term or year to get a problem which they could work out in their own school system the next year, and so improve themselves by making an actual contribution to the science of education.

I am not sure that I am informed with regard to all that has been done in these ways during the year. There are in the state that I know of at the present time fifteen men and women engaged in public school work who are working out as a part of the requirements for an A.M. or Ph.D. degree some practical problem in education. There are twice this number working on similar problems in the University here, men and women who intend to take up educational work as a profession in Indiana. We lose these men almost as rapidly as we produce them, be it said to our shame, because we let other states take them as rapidly as they are trained. But some of them will come back and work right here in Indiana.

Mr. Stone, one of our own graduates, has been making, during this year, a very interesting study in clinical psychology and certain educational problems met with at the Indiana Reformatory in Jeffersonville. This is a line of work that should be very highly commended. There are many problems in this field that need to be worked out. We also have a group of problems presented by our charitable institutions and our state charity workers and by our reformatories, our so-called state institutions. The work of these state institutions presents a number of important educational problems that should be attacked by the application of scientific method and solved. The University should not only lead in their solution, but train men and women for each of these important lines of work. It is a part of the educational work of the state.

But besides these types of special research the following specific studies have been made in the state this year, in addition to the work done by the Bureau of Coöperative Research here at the University: At Richmond they have made a study of writing, one term apart, using the Ayres scale. At Madison they gave the Courtis tests in arithmetic to all pupils in the grades between the fifth and eighth, and will repeat these tests after systematic drill has been carried on. At Franklin they gave the Courtis tests in arithmetic and made a rather careful and unique

study of the mistakes with a view of finding out how to remedy the situation, revealed by the measurements of achievement which they applied. At Frankfort an important and comprehensive program of study has been carried on. All the teachers took some part, either in a program of professional study or in the industrial survey, or in some particular line of research adapted to small groups of teachers. To make this work all the more effective teachers and superintendent would meet together and discuss the results obtained and the methods used, trying to make actual application of the facts which they found, and improvements in the methods of investigation they were using. For example, 300 children were tested by the Binet-Simon scale. The Courtis tests were given in the eighth grade and Stone's test in the sixth grade. The health conditions and physical defects of the school children were studied by one group of teachers and the entire results and their applications discussed at a meeting of all the teachers. Ayres spelling tests were given by another group of teachers, and the results of the different grades and in different buildings studied and compared. Writing and Gray's reading tests were given, I think, in all the buildings. A careful study of the industries of the community was made according to a definite schedule. An age and grade table was worked out for the entire city and discussed in the early part of the school year, the causes and per cent of retardation determined. The results of the school enumeration for a period of years preceding were also collected and studied.

Now, as I stated when I began, one of the ideas that we have had in mind in conducting these conferences is to make the conference here a sort of clearing-house for the discussion of results obtained not only by the Bureau, but for any work that has been done by the school people in the state during the year. So I would like to ask for reports on this work at this time. Mr. Webb, for example, has been making a special study at Franklin and I am going to call on him to tell us what he has done and the results he has obtained.

MR. WEBB: I am not prepared to make a formal report at this time, but I might make this distinction between the Woody test and the Courtis test: The range of difficulty in the different problems given in the Woody tests is much wider than it is in the Courtis tests. The uniformity of difficulty is about the same, as I have found in applying the two tests. For this reason the children in the third grade, for instance, can be compared with the children in the eighth grade very well, and one of the advantages that I have found in applying these tests is to awaken the teachers of the eighth grade to the fact that it is important that they have daily drill on the fundamental processes.

There is a tendency on the part of teachers to assume that all the drill work should be done back in the fourth grade and that there is no need of drill in the eighth grade, but when I found children in the third grade solving more problems correctly than I found true for some of the children in the eighth grade, it wasn't much trouble to awaken that teacher to the importance of drill work in the eighth grade.

The 5A grade solved 79 of the 88 problems given in the Woody tests correctly. There were only 3 other divisions out of the 11 rooms which

took the test who equaled this record. The problems were distributed about equally among the four fundamental processes: subtraction, addition, multiplication, and division.

Another thing that I found to my surprise in applying the Woody test was that some of the simple problems were missed by children in almost every grade. Take, for instance, the fraction $1/3$ plus $1/3$. Many children gave the result as $2/6$. They simply added the numerators and the denominators. I found errors in their conception of what it meant to add fractions, and, not only that, but a number of other things were revealed by those simple problems. They were so simple that they were difficult, and they revealed their ignorance of method. I took time to give the gleanings that I got from grading those papers and distributed those thruout the school.

There is one other test that I put on. It wasn't an arithmetic test, but I found it revealed some facts that were decidedly worth while. It was Hartwell geography test, involving the location of places. There were 80 cities in that test. I found that children in the eighth grade couldn't locate more than 4 or 5 out of the entire list, and most of them were capitals of states of the Union. I found that on an average the children from the fifth grade up could locate only 30 of the 80 on the average, and that was a revelation decidedly worth while. I am sorry I haven't time to tell more of what was done.

MR. BOOK: What was your idea, Mr. Webb, in making a careful study of the character of the mistakes you found in the returns from your test?

MR. WEBB: I found that many times children are making mistakes because of ignorance of methods. I found that a teacher must do as Dr. Judd said yesterday, i.e. make a study of the individual's need, find where the squeak is, and put the oil there.

Many times pupils know better than they execute, but often they make mistakes because they don't know how to proceed. It may be from careless habits, but almost always it is from the fact that they don't know any better. Those careless habits may be in their morals, as well as in their ideas of the principles that are being applied in the solving of problems. If we can find out where the difficulty is, it is little trouble to straighten things out, but many times teachers will pass over those difficulties and never find them out because of mass teaching in place of individual instruction.

If you can get the data before you of 500 or 600 pupils, as I have done, and go thru their work and find where their difficulty lies, it isn't very much trouble to save time in the teaching of all the different grades of the schools. But unless you find this out a great deal of time will be wasted, and a great deal of time will be spent in mass teaching which is useless because the pupils are groping in the dark and do not understand what they are doing or where they are going.

MR. FITZGIBBON: I wonder whether the geography test is an indication of efficient knowledge about geography.

MR. SMITH: I should think it could be, altho locational geography is a very small part of geography work.

MR. WEBB: There is an amount of general information which every child should have; they should know where Chicago is.

MR. FITZGIBBON: Probably, but Montana wouldn't be of any importance to most of us.

MR. WEBB: No, but they should know where Louisville, Indianapolis, and Chicago are, and children generally should know where Chicago is.

MR. FAGAN: I have one question I'd like to ask Mr. Webb. He speaks against mass teaching, and emphasizes individual instruction. We will all agree, but I am wondering whether he knows of any school where the children are taught in arithmetic to distinguish clearly between what is given and what is to be found, and where they are taught to distinguish clearly the process to be used. It seems to me this is a serious trouble with most of our teaching in arithmetic. Our children do not know what is given, they do not know what is to be found, they do not know the process, and they have to be taught along these lines if we are going to get valuable results.

MR. WEBB: I might answer by saying that I have done just this thing. I have even gone farther and had them conclude what the result was. Such an outline as you spoke of has been given to every teacher in the Franklin schools.

MR. BOOK: That is the very point I wanted to bring out. It is one thing, a very important thing, to measure your achievement, to find out by the application of a reliable scale that we have or have not made the progress we think we should be making. It is an additional thing to find out what the trouble is about and how to remedy it. I wanted to emphasize the point that Professor Judd made here this morning in connection with reading when he made a plea for diagnosing the case. We must find out how that particular subject is learned, and what the specific difficulties are which confront the learner at different stages of the learning. We must determine how to meet them successfully.

A number of other studies have been made. Will you state, Mr. Giles, very briefly, what you have done at Richmond in addition to the work you did in coöperation with the Bureau?

MR. GILES: One of the investigations we carried on during the year was a study of the kindergarten instruction in Richmond; how it compared with that given in other cities, or squared with the modern theory of kindergarten teaching. We also wanted to know how we were connecting up the kindergarten instruction with the first grade work, whether or not we were bridging that gap properly. So we asked Dr. Judd to send us someone to do this work. He sent Miss Temple of the School of Education to make a survey of our kindergarten work. She spent two weeks in Richmond. I haven't time and it isn't the purpose here, of course, to tell you about the results of that survey. The report has just been received and we are going over it. We find it very valu-

able for us, not only for the kindergarten, but for the primary teacher as well, and we hope to get a constructive program out of that report. The report will be published by the University of Chicago and will be available at a later date. If you have any kindergarten work in your school I am sure you will be interested in it.

Another investigation we made was on the handwriting situation in the Richmond schools, which we undertook with a definite purpose in view. We have employed this year for part-time work a supervisor of writing. We were anxious to find whether it would pay to do this thing, whether the money that we are spending for a writing supervisor was well spent. So early in the fall semester we measured up the handwriting with the Ayres scale. It doesn't take very long, as you know, and I collected the papers gotten under uniform conditions from the teachers themselves who scored the speed of the writing. I had previously placed a code letter indicating the building and the grade on each one of the samples of handwriting, so that no teacher knew what building or grade she was scoring.

In about an hour we had scored all of the papers for the fourth, fifth, and sixth grades. These results were then tabulated. We also had a scoring period in the present term and did exactly the same thing again. I am sorry I haven't the results of this comparison to give you. The papers are just now being scored and tabulated. That is, the tabulation is being made for this semester in the office, but you will see readily that we had a definite purpose in mind. We will be able to tell, when this tabulation is completed, just what it is costing us in the way of supervision for a certain amount of improvement.

MR. BOOK: Is there anyone else who has been carrying on an investigation that would care to state to the conference the character of the work which he has undertaken? I know that a great many different studies were started and work done along lines discussed here at previous conferences. If anyone else has a piece of work to report on we would be glad to have you report it to members of this conference. We believe it is valuable to have a free round table discussion of all the scientific work that is being done in the state. We should keep in touch with what the other fellow is doing.

MR. FITZGIBBON: I don't know whether this would be dignified as a research problem or not, but a committee of our teachers study very carefully the report of the Indiana Commission on Feeble-Mindedness. Then I discussed that report with the whole body of teachers thru two or three meetings.

MR. BOOK: That is a very interesting and important topic, which we must take up very soon in this state. I want to discuss very briefly in a moment what I believe the next important step should be in the scientific study of educational problems. I feel that one of the most important things which we should accomplish by these conferences and by the studies we are making is to learn to study all our problems scientifically and to apply scientific methods to every phase of our work. One of the most important fields certainly is the one to which Mr. Fitzgib-

bon alludes. Does anyone else wish to give a brief report of work done in his city during the year?

MR. DU SHANE: You mentioned Madison a moment ago. I haven't any formal report to make, but we do daily work in arithmetic. We gave the Courtis tests in arithmetic from the fifth grade to the eighth, inclusive, last February. We repeated these tests in April. After we had given the first tests we arranged a systematic plan of drill work in the four fundamental operations in one of the buildings where they had the fifth and the first half of the sixth grades. In another building we did no systematic drill work. We also did drill work in the seventh and eighth grades. At the beginning of this month [April] we gave the test again to all the students to test the effect of the drill in the fundamental operations.

I haven't the report entirely tabulated, but can say that it proved to us that giving a definite time, say five minutes, to drill each day was of value at least so far as the median score of the entire class was concerned. It raised this considerably. We are just working over the results and I am finding many interesting things. I find, for example, that many of the pupils made a good gain. I find also that some of those who had the systematic drill made practically no gain at all, some of them even lost. A great many didn't do as well on the second examination as they did on the first. I think we are going to get a great deal of interesting material which will be of help to us in deciding how much drill work to do. I feel that this sort of work is a good thing. It gets the teachers interested in their problems. We are beginning to discuss more intelligently methods of teaching arithmetic, as was brought out by Superintendent Fagan a moment ago. As a result of one study some bulletins were issued to the teachers, asking them to give definite instructions to their pupils (1) on the statement of the problems to help them to see what was given, (2) on what they wanted to find out, and (3) on what process was to be used. We hope to get many more results from the work that we did.

MR. BOOK: I know that there are a number of other places in the state where work similar to that reported upon has been done, but we won't have time to have reports from all. I think in closing that it would be in place if I should make a few suggestions in regard to new problems or lines of work which we should be considering.

I think there are two lines of work that can and should be done. One line of investigation falls more directly on the people who are specially trained in our universities. Such investigations as are undertaken in child study and all problems in that field—child physiology, genetic psychology, child hygiene, and problems in the psychology of learning. There are still some of us who believe that a very important problem in all this work is to find out how children actually learn to read, spell, etc. Take reading or writing. We need to know how the learning actually takes place as well as to measure the progress a child makes in the learning. Measuring the rate and amount of improvement made should go hand in hand with an analysis of the learning process. We need to perfect all our scales for measuring the progress made in learning for

reasons that have already been suggested in this conference. They are not perfect; they are the best that we have been able to work out up to the present time and these crude methods of measuring the progress made are far better than mere opinion, as is being demonstrated in nearly every field. We need to perfect these scales for measuring school achievements; we need also to measure and to perfect scales for measuring general intelligence and the special capacities and abilities of children with a view to being more helpful to them, and with a view to directing them more wisely in matters of vocational training and direction. But we need also to determine (1) how these subjects are actually learned, what habits are formed, what functions or abilities acquired; (2) how these habits are acquired in the learning act, and (3) we should determine the difficulties which are encountered in the process of acquisition involved and the factors and conditions which help or retard the learning itself.

A second group of problems can be worked at most advantageously by the coöperation of the school men with the men and women at the University who have the resources of a university behind them and who have leisure time and perhaps a little better training for the careful work that should be done. I want in closing to call your attention to a few of the more important lines of research that should be taken up coöperatively by these two groups of men and women.

1. The first, of course, is the group of problems that we have taken up in this Bureau, measuring school achievement and testing the efficiency of the work done in the instrumental subjects: reading, writing, composition, and the rest.

2. A second line of work that has scarcely been taken up at all, and which I think will have to be worked at scientifically soon, lies in the field of selecting and evaluating the work of teachers and assigning them to the work which they can do best.

In February there was held at Indianapolis a conference of employing managers in large industrial concerns. The problems that they were discussing were: how to select foremen for the different lines of work in stores and industrial concerns; how to take a given body of men and women and place them in the positions where they would render to the concern the greatest amount of service; how to train them on the job. In other words, it was a discussion of the problems of the employing managers. It was a meeting of the men who employ men and women to work in commercial and industrial establishments, and their discussions showed how these men were actually applying scientific method to the solution of all their problems. On the fifth and sixth of this month [April, 1917] a national conference of these employing managers was held in Philadelphia, where the same line of problems was discussed.

Now, here, it seems to me, is a suggestion for a field of work that is tremendously significant and of first importance for superintendents and high school principals, because, as we all know and have always known, the most important single factor in any school system is an efficient teacher. Can you select them? Can you place them where they will do the best work? Can you keep them in good humor and working at their best? Here is a whole group of problems that we haven't touched

at all, and I don't know of any place where we could get better suggestions for the study of this group of problems than from these employing managers' conferences, where we may see how they have worked scientifically at the problem of selecting and training efficient workers.

3. Another group of problems that might be worked at coöperatively is studies and experiments designed to improve teachers while in service. I mentioned some of the results which had been obtained along this line in Frankfort, where superintendent and teachers made scientific studies, surveys, etc. Such work can be taken up coöperatively by any superintendent and his teachers working with one or more men at the University.

4. A fourth line of work that might be taken up is testing various methods of teaching instruction. We haven't done very much in this line. Testing the effects of various methods of instruction might be carried along coöperatively with this matter of measuring the results of learning or school achievement, to which it is very closely related. I have in mind the kind of thing that has been done so extensively and successfully in Germany under the name of "Experimental Didactik".

5. Another line is applying scales for measuring the intelligence and specific abilities of children so that they can be properly grouped in school. We are at present governed largely by opinion. We fail to deal with pupils according to their abilities or real needs. It is my opinion that we should connect up all our tests for school achievement and all our methods of teaching and study of learning much more closely with the matter of intelligence testing than we have ever done if we would get the most efficient results. In all these matters we must take more account of an individual's general ability or power to use all the knowledge and information that he has attained, bringing all his resources to bear upon any particular task placed before him, whether this be learning, playing baseball, or what not.

6. Lastly, it would be well if we should frequently stop to inquire how we stand in Indiana with regard to the following principles, which should be followed by all school officials in the organization and conduct of their schools:

(1) Do we have a clear conception of the exact purpose for which the school exists, and the specific work that is to be done? If not, we may be moving south when we ought to be going north, or traveling in a circle instead of moving straight towards our goal.

(2) Do we have a clear distinction in our own minds between the functions of the board of education and its staff? In other words, is there a proper differentiation between them in actual practice? The situation in this regard in Indiana is anything but ideal, and we should do something to correct it. I think the situation with regard to the proper function of the school board and the staff of people who ought to be experts, whom they hire to manage the school and to be responsible to them for the same, is worse than it was when I began to teach a good many years ago. At any rate, we have some evidences that it hasn't improved as it should. What can we and should we do about it?

(3) Do we have and can you get a competent staff of employes for the different lines of educational activities and business affairs of your

school? Can you select and test the efficiency of these workers in an accurate manner? If not we should apply scientific method to this group of problems in the same way as it is being applied to similar groups of problems by the employing managers of large business concerns.

(4) Is there complete accountability of the general manager, the superintendent, and thru him, of the staff of the school, to the board? Is the accountability based on fact instead of opinion?

(5) Is there coöperation under the leadership of the school between the school and other agencies of the community which are seeking to accomplish the same results?

(6) Are we organized so that there may be made at stated or definite intervals a thoro self-examination of the results actually achieved by the school, measured in objective terms by members of the staff, so that mere educational opinion *without* and *within* the school may be confirmed or refuted?

(7) Some school systems have established bureaus of efficiency or research to handle this phase of the school work. They employ an expert, who checks up the school work done and makes studies, giving to the superintendent and teachers the data needed to make helpful comparisons of every sort. In other cities all this work must be done, if at all, by superintendent and teachers. Are we sufficiently trained for this part of our work? If not, how can we best fit ourselves for this important duty?

(8) I have said nothing about a very important and extensive line of research that has been carried on by the Indiana State Board of Education during the year, studies which were designed to help us solve some of the problems which grow out of our attempts to provide real vocational training for all our young men and women and for the adults who are ambitious to make themselves more proficient in their chosen occupations. This is perhaps the most important step in research that has ever been taken by any state and has attracted the attention of the nation. It is doubly important because it shows that Indiana believes that in all important educational undertakings we should first determine the facts that are needed to enable us wisely to decide what we should do.

You see, I hope, more clearly what is needed in all our educational work. We must learn how to apply scientific method to all our problems, learn to check up our work in ways which will show us exactly where we stand. In this respect I think the situation in Indiana is very encouraging. The fact that more than one hundred superintendents and principals will each year come to the University for a conference on educational measurements, and will during the year engage in scientific studies undertaken to help them in their work and to make them more efficient in applying scientific method to their work, is proof that the educational situation in Indiana is in a very healthy condition. I congratulate you on the work you are doing and hope each one has gotten new inspiration and courage from our meetings for attacking new problems and lines of work which will make our educational efforts still more effective in the future than they have ever been before.

The Determination of Standards in Vocational Education

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THE problem of devising standards for measuring the efficiency of vocational education is identical to that of devising measures for general education. One problem is just as definite as the other, and the needs for measures in both fields are equally urgent. In general education the measure is a test of accomplishment of specific tasks: the number of words spelled correctly; the number of problems in arithmetic solved correctly in a given time; the mastery of thought and ideas of written expressions; or the legibility and speed of handwriting. In vocational education, likewise, the measure must be a test of accomplishment: the speed and efficiency of the young surgeon in performing a certain operation; the successful preparation of a meal in a given time with given materials and equipment; the plastering of a room; or the successful operation of a knitting machine. To date, propaganda work has occupied the attention of the majority of those interested in vocational education and few measures of the efficiency of instruction in any vocational field have been devised for the professions, agriculture, industry, commerce, household service, or public service.

It is obvious that the success of the movement for vocational instruction depends upon those trained in vocational schools having a fund of general and special knowledge, being in possession of certain skills, and being sufficiently adaptable to enable them to perform certain particular tasks the sum of which constitute occupational efficiency.

The first question, then, which must be answered for all vocations for which training is proposed is, What constitutes occupational efficiency? It would seem, at first thought, that this could be very easily determined by merely finding out the standards set up and required for the various professions, for industry, agriculture, etc. But the difficulty lies in the fact that even old and long practiced occupations have erected no such standards for entrance to, or proficiency in, the respective lines of profitable employment. By way of illustration, the medical profession has no set of standards indicating measures of success or failure for doctors in ordinary practice which serve to determine whether the practitioner should remain in the profession or be excluded. The only bars from the profession now are evil intention or gross carelessness. The physician may incorrectly diagnose one-half of his cases and still be rated as successful. In the field of industry standards are (with few exceptions) no more definite. Of fifteen girls working side by side stitching butter boxes on wire stitching machines, three may complete 100 per hour; ten from 100 to 200, and two more than 200. All may receive the same wage and be rated as equally successful. The

work of lathing furnishes another illustration. When the apprentice can lay 1,400 laths a day he is rated as a journeyman, but among successful lathers some lay 1,400, some 1,600, and some as many as 1,800. They are all rated as successful and belong to the same union and sometimes receive the same wage.

In all phases of agricultural production, no attempt has been made to erect standards of any kind, except in a general way; for instance, one who raises 100 bushels of corn per acre is rated as very successful, but there are no standards for the permissive mortality of pigs, chickens, and mules for this successful agriculturist.

Even in the ancient and honorable field of teaching there are few standards by which a superintendent may measure the success or failure of members of his teaching staff.

In general, therefore, the occupations themselves have no very tangible standards of accomplishment which may serve as guides in devising courses in vocational schools and in determining when accomplishments of students meet the requirements of the working world. The vocational survey, of which occupational analysis is an important part, is a means which has been developed for determining standards of occupational efficiency required in the working world. This device is not new. The first occupational survey in this country was made in 1724 and represents a wonderfully interesting combination of patriotic appeal and occupational analysis. It was published by Francis Rawle and is entitled, "Ways and Means for the Inhabitants of Delaware to Become Rich". Part of the Introduction follows:

"As Trade is a noble subject most copious, so it deserves a better Genius and capacity than I am master of, to discourse on the several branches thereof.

"But some ingenious and well meaning Persons having employ'd their Pens that way, from the generous Motives and views of promoting the public Good, I persuade myself 'tis a good Omen and Presage of the future Happiness of a Country, especially when it appears in private Persons, who for the most part may be presum'd to be free from the Byass of sinister Interest; whereas public Projectors, under the specious Pretenses of Public Spiritedness and Promotion of Trade, secretly carry on their private Interest, without any true regard of the Publick, and which they too often sacrifice to the great Damage if not Ruin thereof."

After describing at length many opportunities for industrial development, Rawle writes the following about the possibilities of paper making:

"Paper: Another manufacture is what we have fallen into of late years, and in Time may be improved equal to Dutch & French Paper, and is chiefly Labour, which saves us the costs to be laid out and otherways, as observ'd in other cases and employes some poor People to find a living by gathering Rags which would otherwise be lost."

At a little later date the following occupational description of paper making was printed:

"The Germantown of which I spoke before,
Which is, at least, in length one mile or more,
Where lives High German People and Low Dutch,
Whose trade in weaving linen Cloth is much.

There grows the flax, as also you may know,
 That from the same they do divide the Tow;
 Their trade fits well within their habitation,
 We find convenience for their occasion.
 One trade brings in employment for another,
 So that we may suppose each trade a Brother;
 From Linen Rags good paper doth derive,
 The first trade keeps the second trade alive;
 Without the first the second cannot be,
 Therefore since these two can so well agree,
 Convenience doth appear to place them nigh,
 One in Germantown, T'other hard by.
 A paper mill near Germantown doth stand,
 So that the Flax, which first springs from the land,
 First Flax, then Yarn, and then they must begin,
 To weave the same, which they took pains to spin.
 Also, when on our backs it is well worn,
 Some of the same remains Ragged and Torn;
 Then of our Rags our Paper is made,
 Which in process of time doth waste and fade;
 So what comes from the Earth, appeareth plain,
 The same in Time, returns to Earth again."

The following description of the work of the ragpicker at Brittany, published early in the eighteenth century, is further evidence that interest in occupational analysis is not new:

"In Brittany, he is a cross between a wandering Jew and a gypsy; he leaves his family in some mountain den in search of rags; goes from farm to farm and castle to cottage. To the rich, his visits appear almost as insults. If he knocks at the door of some well-to-do farmer, 'Go elsewhere,' says the master, 'we have no rags here.' 'Ah, well I'll come another day' replies the pillawer, with a glance of malice forboding; and he passes on for the time, sure of finding poverty and rags at no great distance. But even in the poor man's cottage he never sets foot; he waits at the threshold while the rags are brought to him and the bargaining is made outside the house. No seat in the chimney corner nor even a cup of cider, is offered the ill-omened trader in misery."

Emile Souvestre, in *Barzaz Breiz Deniers Bretons*, describes him in the poetry of an old Breton ballad:

"Rude is the life of the pillawer;
 He tramps through the deep roads, with no shelter from the rain, but
 the overhanging roots. His fare is the manchet of black bread and
 he drinks from the mere where the frogs croak.

"He sets out, this pillawer; he descends the mountain;
 His path lies among the poor of the earth. He leaves behind him wife
 and children to return after long months. Perhaps no more.

"Onward goes the pillawer, onward still, like the wandering Jew; he
 has none to love him; no kin, no friends to greet him in the low
 lands; men close their door when they see him for he passes among
 them for a man without faith.

"Sundays and fete days, he is ever on the road; he hears no mass nor
 office; he is never seen to pray at the grace of his father or mother;
 he confesses not to priest; the lowlanders say that the pillawer has
 neither parish nor creed.

"Foul with dirt are the rags which the lean horse drags along, but the running water shall one day wash them clean; the rending wheels shall grind them and they shall come forth as paper, faire than white lawn.

"So with thee, poor pillawer; one day thou wilt leave thy corpse and tattered rags in the roadside ditch, but thy soul will fly forth white and fair, and the angels will bear it away to Paradise."

Since these early descriptions were printed, and, particularly during the last ten years, many occupations have been described in more or less detail so that now such descriptions are available for over four hundred profitable pursuits.

The majority of these studies are in the field of industry, but even in this field the data are still quite inadequate and incomplete. For example, during the last three years phases of the printing trades have been analyzed in great detail in Richmond (Va.), Cincinnati, New York City, Minneapolis, Cleveland, Indianapolis, Evansville, and Richmond (Ind.); they have been partly analyzed at least six more times, not including a score or more minor analyses to which they have been subjected. In spite of all the work and expense, estimated to have been at least \$20,000, we have as yet no clear picture of all phases of the printing trades. We have no descriptions of city or rural newspaper shops, small job shops, or any of the art processes, or any of the business and managerial phases of the industry. In other words, the sum of all the twenty-five or more surveys of this trade thus far made does not constitute a complete picture of this industry. This field is cited as being typical of all. These inadequacies are due to two reasons: first, the adoption of the community unit for the study; and secondly, the lack of standards, forms, and methods of study for occupational analysis. For complete occupational pictures, the basis of approach must be the industry rather than the community, for in no one community are all the phases of the occupation to be found. For example, the automobile industry cannot be thoroly studied alone in Indianapolis, but requires studies in Detroit, South Bend, Kokomo, Richmond, Muncie, and Anderson. Likewise, the piano industry cannot be adequately studied in Richmond, Ind., as large shares of the industry are carried on in Newcastle and Hammond, and the agricultural implement industry is not inclusive in Evansville, Columbus, or Richmond.

The need for standard forms and methods of procedure is very great. Without such forms comparisons are impossible. It would seem, after careful study of all occupational reports printed, and after some participation in work of this sort, that the following sequence of topics and questions would constitute a form suitable for universal use in all types of occupational analysis, including the professions, agriculture, industry, household arts, and public service.

ANALYSIS OF OCCUPATIONS

1. What the worker does—

General description of work.

Materials handled.

- Machines; names; set up; operate; repairs (adjust).
- Range of work.
- Receiving orders, reporting work done.
- 2. Mental and physical requirements—
 - Height, weight, strength, discrimination (ability).
- 3. General knowledge required for entrance, for efficiency, for promotion—
 - General education desired.
 - Elementary school; high school.
- 4. Common deficiencies of workers—
 - Education and personal.
- 5. Special knowledge required.
- 6. Skill required.
 - How much prerequisite technical education.
- 7. Can special knowledge or skill be obtained on job?
 - By specific instruction.
 - Period of learning.
- 8. Promotion—
 - Lines of promotion.
 - Factors conditioning promotion.
 - Experience, education, personality.
- 9. Source of workers—
 - By promoting employees.
 - Advertising.
 - From other establishments.
 - Direct application.
 - Personal recommendations.
- 10. Method of selection—
 - Interview, test, trial, examination.
- 11. Seasonableness of overtime—
 - Number of weeks idle.
 - When summer half-holiday.
 - Number of hours overtime.
 - When payment.
 - Vacation period: payment.
 - Extra help: when needed.
- 12. Working conditions—
 - Sit or stand.
 - Dangers from machines.
 - Temperature and ventilation.
 - Dangers from gas.
 - Space-sanitation.
 - Peculiar strains: physical and mental.
 - Light conditions: artificial and day.
- 13. Wages and earnings.

By this method of procedure the actual requirements of occupations may be obtained, and, having obtained a complete list of particulars of requirements for occupations for which training is proposed, the next step is to devise standard courses of instruction. There are no inherent

difficulties or reasons why most vocational courses should not be standardized as to duration, course content, and organization, and methods of instruction. Variations will result, not from the differing content of courses, but from individual differences in aptitudes and capacities of students and the abilities of the teachers.

Standardization must also become effective in vocational school plants, and equipments, not only in tools and rooms but in library and reading-room facilities. The variation in equipment is most surprising. Machine shop instruction is conducted in rooms with equipments varying in costs from \$200 to \$20,000, and schools of education for the vocational preparation for teaching are supported on budgets ranging from \$10,000 to over \$500,000. With a very definite task such as the training of a machinist, or the training of a teacher, it is unreasonable that there should be great differences in equipment and upkeep costs per capita, for the respective fields.

Standardization is also vitally needed in measuring the training and experience and teaching ability of the vocational teachers. The current practice is to employ vocational teachers from among those who are rated as successful in their vocation. For example in the field of industry teachers are chosen from among journeyman workmen. In industry, the term journeyman now conveys no real meaning, for a journeyman carpenter may know practically nothing of carpentry from the all-round trade point of view, and a journeyman plumber may merely know how to assemble units of plumbing fixtures received from the factory. Also, in commerce, the bookkeeper who is rated as successful, who may be chosen as a vocational teacher, might know only the one system of bookkeeping followed in his establishment. Therefore, in selecting vocational teachers we must standardize requirements of practical experience, listing all phases which are necessary for adequately teaching the course which is outlined.

Summarizing the lines in which standards in vocational education must be derived: first, the detailed requirements of the occupation must be determined; secondly, standard courses must be prepared; thirdly, standards for measuring accomplishments must be formulated; lastly, there must be standards for the selection of teachers and measuring the efficiency of their instruction.





